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FULLY ILLUSTRATED

WITH

LITHOGRAPHS, ENGRAVINGS, AND HISTORICAL., POLITICAL AND PHYSICAL MAPS

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Incas, the name of a native tribe of Indians in Peru; also especially applied to the rulers of the tribe before the Spanish conquest. See *Peru.*

In'cense, aromatic substances burned in religious rites on account of the sweet odor they emit. The custom of burning incense is ancient and widely spread. Among the Jews the practise was enjoined as part of the worship of the sanctuary (Ex. 30 : 27), the ingredients of the incense also being laid down, and it was to be burned on a special altar, called the *altar of incense.* This altar was made of acacia (shittim) wood, and was overlaid with gold, hence it was also called the *golden altar,* as distinguished from the altar of burnt offering, which was made of brass. The incense was burned daily — morning and evening. In ancient Egypt, Assyria, Babylonia, India, Greece, and Rome incense-burning was part of the worship of the gods, and it is still employed as part of the Buddhist ceremonial. Both the Greek and the Latin churches use incense in worship, but the practise cannot be shown to have existed among Christians till after the first four centuries. Among the Catholics it is used at every high mass, at consecrations of churches, in processions, funerals, etc.

Inclined Plane, a plane forming with the horizontal plane any angle whatever excepting a right angle. It is one of the mechanical powers by which a small force under certain conditions is used to overcome a greater force. When a body lies on an inclined plane part of its weight is supported, so that if a cord be fastened to it and pulled, a force less than the weight of the body acting in a direction parallel to the plane will prevent it from sliding, or will move it up the plane. Thus a heavy wagon is raised on an inclined road by a horse which would be quite unable to exert a pull equal to a quarter of the weight of the wagon. Neglecting friction, the force parallel to the plane necessary to raise the body is equal to the weight of the body multiplied by the vertical height through which it is lifted, divided by the distance it is moved along the plane.

Incombustible Cloth, cloth rendered uninflammable by artificial means. This may be done by steeping the fabric in borax, phosphate of soda or ammonia, alum or sal-ammonia; but these salts are not suitable for fine fabrics, and that which has been found to answer the purpose most effectually is tungstate of soda. A solution containing 20 per cent. of this salt, along with 3 per cent. of phosphate of soda, renders a fabric perfectly non-inflammable.

Income Tax, a tax levied directly from incomes of every description, whether derived from land, capital, or industry. An income tax was imposed as a war measure in 1862 and was repealed in 1871. A subsequent statute in 1895 was declared unconstitutional by the supreme court.

Incubation, the mode in which birds commonly bring forth their young, that of sitting on the eggs till they are hatched by the natural heat of the body. In general it is the female which undergoes the labor of incubation, but among some species, chiefly of monogamous birds, the male relieves the female while she seeks her nourishment; in others the male feeds her. *Artificial Incubation,* the hatching of eggs by prolonged artificial warmth, has been long practised among the Egyptians and Chinese.

In'cubus, a spirit or demon, to whom was formerly ascribed the oppression known by the name of *nightmare.* These demons play a somewhat important part in the superstition of the Middle Ages.

Indemnity, a term frequently employed in politics and jurisprudence. It is used in various significations, but is usually applied to an act of the legislature passed for the purpose of relieving individuals, especially in an official position, from the penalties to which they may have rendered themselves liable by some violation of the law whether by act or omission.

Inden'ture, a deed entered into between two or more parties, and so called because duplicates of every deed between two or more parties were once written on one skin, which was cut in half, with a jagged or indented edge; so that they were seen to belong to one another.

Independence, Buchanan co., Iowa, 40 mi. n.n.w. of Cedar Rapids. Railroads: B. C. R. & N., and Illinois Central. Industries: iron foundry, flouring mills, etc. It is the seat of the Iowa State Hospital for the Insane. Pop. 1900, 3,656.

Independence, Jackson co., Mo., 10 mi. e. of Kansas City. The surrounding country is an excellent agricultural and stock-raising district. Railroads: C. & A.; Missouri Pacific; and K. C. I. & R. T. Industries: extensive woolen, flour, and cider mills, elevator, iron and brass foundries and machine shops. Fruit growing, bee culture, and raising of blooded horses and cattle are also important industries. Pop. 1900, 6,974.

India, a name properly applicable to the whole of the British Indian Empire, which includes Burma, but popularly restricted to the great central peninsula of Southern Asia. It forms an irregular triangle, insulated from the rest of Asia by the almost impassable ranges of the Himalayas, the Hindu-Kush, and Suleiman mountains, and by the Indian Ocean. Its length n. and s., and its greatest breadth e. and w., are both about 1,900 mi. Within these borders is an area of about 1,296,000 sq. mi., with a population of about 250,000,000. India may be regarded as consisting of three separate regions, well defined by differences of soil, climate, productions, and population. The first is the region of the Himalayas. Immediately s. of the Himalayas lies the vast North Indian plain, containing the most fertile and densely populated portions of the empire. South of the northern plain rises the third region of India, the triangular plateau of the Deccan, which has a general elevation of from 2,000 to 3,000 ft. Its north-

ern scarp is formed by a number of hill ranges known as the Vindhya Mountains. The other two sides of the Deccan are formed by the Eastern and Western Ghâts, which stretch southward along the eastern and western coasts of India, the latter rising in the Nilghiris or Neilgherries to the height of 8,760 ft. The vast North Indian plain is watered by three distinct river systems, which collect the drainage of both the northern and southern slopes of the Himalayas. The first of these systems rises on the northern side of the Himalayas, and makes way through their western ranges into the Punjab as the Indus and Sutlej. The second rises in the same quarter, not far from the sources of the Indus and Sutlej, but flows in an opposite direction, and enters India on the e. as the Brahmaputra of Assam and Eastern Bengal. As these two systems convey to India the drainage of the Thibetan slopes of the Himalayas, so the third system, the Ganges, with its tributary the Jumna, drains the southern slopes; traverses the central part of the Indian plain; unites near its mouth with the Brahmaputra, and forms the immense delta known as the Sunderbunds. The Ganges for thousands of years has occupied a prominent place in Indian civilization, and was the sole channel of traffic between Upper India and the seaboard until the opening of the railway system in 1855. The Indian rivers in the lower portions of their courses afford a natural system of irrigation, but in the higher parts an extensive system of canal irrigation is required. The Ganges and Jumna canals alone irrigate an aggregate area of about three million acres. The coasts of India have very few indentations, and consequently few good natural harbors. There are no lakes of any extent, Chilka and Kolair on the e. coast being the largest.

Climate. — In Southern India the climate of course is tropical, and generally the heat is very great. Among the higher elevations of the Himalayas an Alpine climate prevails. The Indian plains are, especially in summer, sultry, unhealthy, and partly barren. The Deccan and the slopes of the Himalayas enjoy a temperate climate. The climate of the Nilghiris is healthy and pleasant, and several sanatoria for Europeans have been established there, as well as on the Himalayas. Throughout the entire country there are only two annual seasons, the dry season and the rainy season. The rainfall depends upon the monsoons. On the western coast the rainy season begins with the southwest monsoon, and lasts from May till November; on the east coast the rainy season, following the southeast monsoon, lasts from November till March. The rainfall, however, is distributed with great irregularity.

Botany and Zoology.—The flora of India offers nothing very distinctive. In the Himalayas it has to a considerable extent a European character; in the south it is tropical. Many plants of temperate climates, such as wheat, barley, European vegetables, etc., are grown in the northwestern and other parts, while various products of warmer regions are also cultivated, such as cotton, rice, indigo, oilseeds, jute, tobacco, sugar cane, cocoanut, date, and other palms, spices, etc. Coffee, tea, and cinchona, though of recent introduction, are now extensively cultivated in India, the first particularly on the slopes of the Western Ghâts and in the Nilghiris. The tea plant is also grown in the south, but especially in Assam and along the lower slopes of the Himalayas. European fruits abound, and among cultivated fruits may be mentioned the mango, lantain, pomegranate, citron, orange, lime, melon, fig, almond, pineapple, guava, jack, and tamarind. Among trees the teak forests under the protection of the government are of most economic value. The bamboo, the banyan, the sappan, the saul, etc., are all characteristic of Indian forest scenery. In Bengal and some other parts the natives live chiefly on rice, but millet is the staple food grain; barley, wheat, with sweet potatoes, onions, garlic, etc., being also largely used. Opium is cultivated in Bahar, Benares, and Malwa. The vast forests of India are tenanted by great numbers of wild animals, birds, and reptiles. Large herds of elephants are still met with in Nepaul, Eastern Bengal, and the Nilghiris; the bear, the wild boar, and rhinoceros chiefly in the woods of the Eastern Himalayas; the tiger is found in every part of the country; the lion is now almost extinct. Other carnivorous mammals are the leopard or panther, cheetah, wolf, fox, jackal, and hyena. Several antelopes and deer, wild sheep and goats, the wild ass, the great gaur ox or "bison," the wild buffalo, are among the fauna. Snakes and reptiles in all varieties are very numerous, and the cobra and other snakes cause numerous deaths. Among domestic animals are oxen, camels, horses, mules, sheep, and goats. Of birds, eagles, vultures, the peacock, parrakeets, the adjutant bird, etc., are characteristic species. Fish are plentiful and in great variety.

Minerals.—India is richly endowed with minerals; hardly a single metal seems to be wanting; but they are not worked to any extent. Coal, iron, and salt receive most attention.

Divisions, Administration, and Population.—In 1858 the administration of the British possessions in India was transferred from the East India Company to the crown, and in 1877 the British queen assumed the title of Empress of India. The country has long been divided into the three presidencies of Bengal, Madras, and Bombay; but the first of these was latterly subdivided into several provinces, and its name has now little or no administrative significance. The lieutenant governors, chief commissioners, and other officers at the head of the various divisions are subordinate to the governor general or viceroy, representing and appointed by the crown, but each has a large measure of independence. The governor general in council has power to make laws for all persons within the Indian territories under British rule, and for all subjects of the crown

within the allied native states. He acts under the orders of the secretary of state for India, who is assisted by a council of fifteen and is always a member of the British cabinet. In India the supreme executive and legislative authority is vested in the governor general, the capital being Calcutta. Besides the provinces of India under direct British administration there are a number of native or feudatory states, the relations of which to the British administration are somewhat varied. Practically, however, they are all more or less under control of the Indian government. Their area is 509,730 sq. mi., and their population 55,191,742. Gujerat, Rajputana, Haidarabad, Mysore, Orissa, and Travancore are important native states. The total pop. of India, 1901, is 294,266,000.

The total European and native army numbers 208,000, the native army (134,000) being officered by Europeans. The armies of the feudatory or independent states of India number 350,000 men.

About 70 per cent. of the population are engaged in cultivating the soil, while only about 3 per cent. reside in towns of over 50,000 inhabitants. Opium, which forms a government monopoly, and salt, on which a considerable duty is levied, are the other two important sources of revenue. The chief currency in India is silver, and the amount annually coined is large. A government paper currency was introduced in 1861. Circles of issue with subordinate agencies were established in the chief towns; and notes of from 5,000 to 10,000 rupees were made a legal tender within the circle. The chief money denomination is the *rupee* which is divided into 16 *annas*, the anna again being equivalent to 4 *pice*. The primary standard of weight, called the *ser*, is equal to 2.205 lbs. A weight in common use is the *maund*, in Bengal 82 lbs., in Bombay 28 lbs., in Madras 25 lbs. By an act passed in 1889 the imperial yard is made the standard measure of length.

Communications, Trade, etc.—Some of the irrigation canals as well as the rivers supply means of internal navigation, but the construction of railways has been the most important step taken to render the internal communications of India permanently efficient. A considerable portion of the railway system was constructed by companies on whose capital interest at the rate of 5 per cent. was guaranteed by government. Government, however, no longer intrusts the railways to private enterprise, and all lines sanctioned by it are now constructed by the state. The total sanctioned mileage open and under construction in 1896 was 19,678 mi. There were (1896) 1,362 telegraph offices, with about 138,256 mi. of wire. The imports, including bullion and specie, for year ending March, 1896, amounted to 82,675,380 rupees or $330,000,000, and the exports to 118,495,441 rupees or $474,000,000. About half the imports consist of cotton goods; the exports comprise cotton, opium, oil seeds, rice, wheat, jute, indigo, tea, cotton goods, etc.

Inhabitants, Languages, etc.—India has been peopled by several races which have now become more or less mixed. The Hindus, who are partly of Aryan or Indo-European origin, partly of non-Aryan origin, are by far the most numerous. In the south dwell people of a non-Aryan and Dravidian stock; and the remainder is made up of Arabs, Parsees, Mongolians, etc. The Europeans number about 121,000, and in addition there are about 110,000 Eurasians, i.e., the progeny of Hindus and Europeans. Of non-Aryan languages there are about 150 dialects. The Dravidian languages, the chief dialects of which are the Tamil, Telugu, Kanarese, and Malayalam, are spoken by about 28 millions of people in Southern India. The principal of the modern Aryan vernaculars derived from the ancient Sanskrit and Prakrit are Hindi, Marathi, Punjabi, Bengali, Uriya, Sindhi, and Gujerati. Hindustani, a corrupted form of Hindi filled with Persian and Arabic words, is the language of the Mohammedan conquerors of India, and has been adopted as the official language and means of general intercourse throughout the peninsula. The leading religion is Brahmanism, the professed creed of the majority of the Hindus and the religion most distinctive of India. It reckons 207,731,727 adherents. Large numbers in the north and northwest are Mohammedans, Buddhists, Fireworshipers and Sikhs. Education is now making good progress, schools and colleges of all kinds having been established throughout the country. The pupils, however, only number about 3,195,220 in all. There are universities (examining bodies only) at Calcutta, Bombay, and Madras, besides two at Lahore and Allahabad.

History.—The early history of India is obscurely written in the myths of Sanskrit literature, but the first fact of any certainty is that about the year 2,000 B.C., or even earlier, an Aryan people of comparatively high civilization descended from the mountain regions of the northwest into the plains of India and subdued the original inhabitants there. The expedition of Alexander the Great to the Indus in B.C. 326 gives us a momentary glimpse of that part of India; but between his invasion and the Mohammedan conquest there is little authentic political history of India. In the third century B.C. Buddhism was established throughout India, but it afterward entirely gave way to Brahmanism. The first six centuries of the Christian era were occupied by struggles between the native dynasties and invaders from the northwest. In the eighth century the tide of Mohammedan conquest began with Kasim's advance into Sind (711 A. D.). But the Mohammedans were again driven out in 828, and for more than 150 years afterward the strong feudal and tribal organizations of the northern Hindu kingdoms was a barrier to the Mussulman advance. At length in the year 1001 Mahmud of Ghazni reduced the Punjab to a province of Ghazni, and the Mohammedan power was gradually extended into Southern India. In 1398 Timur, or Tamerlane, led a great Mogul (or Mongol) invasion of India, and after sacking Delhi retired into

Central Asia. In 1526 Sultan Baber, a descendant of Tamerlane, founded the Mogul Empire in India. His grandson Akbar reigned from 1556 to 1607, and extended his power over most of the peninsula. His son Jehanghir received an ambassador from James I in 1615. During the reign of his successor, Shah Jehan, famous for his architectural magnificence, the Mahrattas began to be formidable in Southern India. Shah Jehan was deposed in 1658 by his youngest son Aurengzebe. The Sikhs, a Hindu sect formed a religious and military commonwealth in the Punjab in 1675. On the death of Aurengzebe in 1707 the Mogul Empire began to decline. In 1738 Nadir Shah of Persia swept down on Hindustan, and sacked Delhi. The two immediate successors of Aurengzebe, Bahadur Shah, and Jahandar Shah, were incapable rulers, practically under the control of the vizier Zulfikar Khan. The three following were mere names under cover of which Husain Ali, governor of Behar, and Abdulla, governor of Allahabad, controlled affairs. During the reign of Mohammed Shah the Mahrattas, who had already subdued the Deccan, wrung first Malwa (1743) then Orissa (1751) from the feeble grasp of the Mogul emperor. The same year saw the first inroad of the Afghan prince Ahmed Shah, followed in quick succession by three other invasions, to repel which the assistance of the Mahrattas was obtained. In 1761 the decisive battle of Panipat was fought between the Afghans and the Mahrattas, and ended in the defeat of the latter. The victor Ahmed Shah still recognized the emperor Shah Alam, but the dignity was little more than nominal. Shah Alam was succeeded in 1806 by Akbar II, who was succeeded in turn by Mohammed Bahadur Shah, the last Mogul emperor, who d. at Rangoon a British state prisoner in 1862.

In the beginning of the sixteenth century the Portuguese, following in the wake of Vasco da Gama, had established factories and fortresses on the coasts of Malabar, and soon extended their power over nearly all the ports and islands on the coasts of Persia and India. In 1595 the Dutch gained a footing in India. The English East India Company had formed commercial settlements in India as early as 1613, Surat being the chief station. A grant of a small territory around Madras was received from the rajah of Bijnagar in 1639, on which was erected the fort of St. George. Madras became a presidency in 1654. Calcutta, ultimately the seat of government in India, was settled in 1690, and became a presidency in 1707. The English early came into collision with the Portuguese and Dutch, but it was the struggle with the French in India, whose first settlements were founded in 1604, for influence over the native princes, that led, step by step to the establishment of the British Empire in India. The first conflict with the French took place in 1746, when the English lost Madras, which was, however, restored by the treaty of Aix-la-Chapelle. In 1751 Dupleix, the French governor at Pondicherry, was powerful enough to place creatures of his own on the thrones of the Deccan and the Carnatic. The English supported rival candidates, and the result was a second war, which left English influence predominant in the Carnatic, though the French still controlled the Deccan.

In Bengal Mir Jaffier soon found himself unable to meet the exorbitant claims of his allies, and in 1760 he was deposed in favor of his son-in-law, Mir Kasim, who agreed to pay the balance due by Mir Jaffier as well as grant the districts of Burdwan, Midnapore, and Chittagong to the English. But disputes soon led to a war, in which Mir Kasim was worsted and forced to flee. The British retained the collectorship or fiscal administration of Bengal, Behar, and Orissa, under the fiction of a grant from the Mogul emperor. A nominal native ruler, however, was still appointed in the shape of a nawab, who received an allowance of £600,000, and the actual collection of the revenues was still left to the native officials. This system of double government established by Clive was abolished in 1772 by Warren Hastings, who appointed English officers to collect the revenues and preside in the courts, and thus laid the foundations of the present system of British administration in India. In 1774 Hastings was made governor general of India. Among the notable measures of his vigorous rule were the refusal of the £300,000 of the Bengal tribute to the Mogul emperor, the sale of the provinces of Allahabad and Kora (assigned by Clive to the emperor in 1765) to the Nawab of Oudh, and the loan of British troops to the same nawab for the subjection of the Rohilla Afghans. For these and other acts, such as the extortion of heavy fines and forfeitures from the Begum of Oudh and the Rajah of Benares, Hastings was impeached on his return to England. In 1778 the intrigues of the Bombay government led to the first war with the Mahrattas, in which the British arms were only saved from disgrace by the achievements of the Bengal army which Hastings sent to the aid of the other presidency; and in the war with the sultan of Mysore the diplomatic skill of Hastings, and the valor of the Bengal troops under Sir Eyre Coote, again won victory for the British, In 1786 Lord Cornwallis succeeded Hastings as governor. His rule is memorable chiefly for the war with Tippoo, sultan of Mysore, which terminated in the sultan having to surrender one half of his dominions to the British and their allies. Sir John Shore succeeded as governor general in 1793. He was followed by the Marquis of Wellesley, who arrived in 1798, and whose policy eventually made the British power paramount from the Himalayas to Cape Comorin. Under him Tippoo of Mysore was completely overthrown (1799) and the second Mahratta war successfully concluded, Sir Arthur Wellesley (latterly Duke of Wellington) having won the victory of Assaye (Sept. 23, 1803), and General Lake that of Laswaree (Nov. 1, 1803). In 1805 Lord Cornwallis went out as governor general for the second time. He died soon after his ar-

rival, and was succeeded by Sir George Barlow, and he by Lord Minto in 1807. In 1809 some disturbances at Travancore and Cochin led to these regions being placed under British control. During the governorship of the Earl of Moira (Marquis of Hastings, 1814–23) there was a war with the Goorkhas of Nepaul, which after a short struggle ended with the cession to the British of Kumáon; and another with the three great Mahratta princes, the peshwá of Poona, the rajah of Nágpur, and holkar of Indore. The peshwá's territory was annexed; the other Mahratta princes were compelled to accept alliances placing them under British protection. A new province, the nucleus of what are now the Central Provinces, was formed out of territory recovered from the Pindárís. In 1823 Lord Amherst succeeded as governor general. During his administration the first Burmese war arose, and was concluded in 1826 by the cession to the British of the provinces of Aracan and Tenasserim. Under Lord William Bentinck's rule (1828–35) administrative reform and the moral elevation of the peoples of India were chief subjects of consideration. In 1836 Lord Auckland assumed the governorship. Two years later the Afghan War broke out, and terminated in the disastrous British retreat. (See *Afghanistan.*) During Lord Ellenborough's administration Sind was annexed. Sir Henry (afterward Lord) Hardinge succeeded in 1844, and the year following the Sikhs, originally a religious sect who had conquered the Punjab, crossed the Sutlej in great force. Four hotly contested battles, at Mudki Firozshah, Aliwál, and Sobráon, left the British masters of the field. Part of the Sikh territory was annexed, and the infant Dhuleep Singh recognized as rajah of the rest. During the governor generalship of the Earl of Dalhousie, 1848–56, a new war broke out with the Sikhs, and after their final defeat by General Gough at Gujerat, Feb. 21, 1849, the Punjab was annexed to the British dominions. This was immediately followed by the second Burmese war, ending in the annexation of Pegu, June 20, 1853. The Indian states of Sattara, Jhansi, and Nágpur were, on the failure of the native succession, annexed to the British possessions, 1852–56, and Oudh also brought directly under British rule. During the same administration the extensive scheme of Indian railways, the telegraphs, and steamship connection with Europe via the Red Sea, were planned and inaugurated, the Ganges Canal opened, and the Punjab Canal begun.

The administration of Viscount Canning (1856–61) was distinguished by a short war with Persia, and especially by the great Sepoy mutiny. Several outbreaks among the native soldiers took place during March, 1857. The first formidable revolt, however, was at Meerut on May 10, where the Sepoys of the Third Light Cavalry, assisted by the Eleventh and Twentieth Regiments of infantry, rose and massacred the Europeans. They then fled to Delhi, where they were immediately joined by the native garrison. Here another massacre took place. The revolt spread rapidly through the Northwestern Provinces and Oudh, down into Lower Bengal. Only in the Punjab the prompt measures of the governing officials in disarming the Sepoys prevented an outbreak, and the Sikh population continued steadily loyal. Wherever the mutiny broke out it was attended with savage excesses. At Cawnpore the revolted Sepoys were headed by Nana Sahib, the heir of the last peshwá of the Mahrattas. After a heroic attempt to defend themselves, the Europeans capitulated on the sworn promise of Nana Sahib to allow them to retire to Allahabad. On the 27th the survivors, about 450 in number, were embarking when they were attacked by the Nana's troops, and the men indiscriminately massacred. The women and children, 125 in number, were carried back to Cawnpore and kept till July 15, when they were all cut to pieces on the approach of Havelock's army. Cawnpore was stormed the day following. At Lucknow Sir Henry Lawrence had the foresight to fortify and provision the Residency, where the garrison held out till relieved by Havelock and Outram on September 25. But Havelock was in turn besieged, and was with difficulty relieved (November 17) by Sir Colin Campbell, afterward Lord Clyde. Delhi, meanwhile, had fallen, chiefly owing to the skill and valor of Sir John Lawrence. By May, 1858, when Bareilly was taken, Sir Colin Campbell and Sir Hugh Rose had restored order, and the mutiny was at an end.

In 1858 the direct sovereignty of India, and the powers of government hitherto vested in the East Indian Company, were vested in the British crown. Lord Canning returned to England early in 1862, and was succeeded by the earl of Elgin, who died in 1863. Sir John (afterward Lord) Lawrence was governor general from 1863 to 1868, when he was succeeded by the earl of Mayo, who did much to develop the material resources of the country by removing the restrictions upon trade between the different provinces, and constructing roads, canals, and railways. He was assassinated by a Mohammedan fanatic in the Andaman Islands, Feb. 8, 1872. Lord Northbrook became viceroy in 1872. During his administration a famine in Lower Bengal, successfully obviated by a vast organization of state relief (1874), the dethronement of the gaekwár of Baroda for disloyalty (1875), and the tour of the Prince of Wales through India (1875–76), were the chief events. In 1876 Lord Lytton was appointed viceroy, and on Jan 1, 1877, Queen Victoria was proclaimed Empress of India at Delhi. In 1877–78 another disastrous famine occurred, and despite the most strenuous efforts of the government over five million persons are said to have perished. In 1878 the intrigues of Shur Ali, amir of Afghanistan, with Russia, led to a declaration of war on the part of the British. After two campaigns Abdurrahman Khan was established on the Afghan throne by British arms. In 1880 Lord Ripon succeeded as viceroy; being followed in 1884 by Lord Dufferin, under whose rule took

place the annexation of Upper Burma, on Jan. 1, 1866. Following are the viceroys of India since 1888: Marquis of Lansdowne, 1888–1893; Earl of Elgin and Kincardine, 1893–1898; George H. Curzon, 1898.

India Ink, name given to two kinds of indelible ink, one made in Turkey and Asia from cuttle fish, the other in China of lampblack, glue and camphor.

Indiana (in'di-an'a) the *Hoosier State*, one of the East Central states, is bounded on the n. by Lake Michigan and the state of Michigan; on the e. by Ohio; on the s. by Kentucky, from which it is separated by the Ohio river; on the w. by Illinois. The extreme length of the state is 277 m.; average breadth, 145 m.; gross area, 36,350 sq. m. In 1900, the population asw 2,516,463, of which 57,960 were colored.

Surface.—The surface is a plain, sloping gently to the south and west. The mean altitude is about 735 ft. above the sea level. The highest land is a level plateau in Randolph county, 1,205 ft. Nearly the whole state lies in the Mississippi drainage basin. The Wabash is the principal river; its chief tributaries are the Tippecanoe and the White rivers. Other rivers are the Maumee, the Elkhart, the Kankakee, and the Whitewater. North of the Wabash are many lakes occupying depressions formed by glacial action.

Climate.—The winters are very cold with piercing north winds and the summers hot, but tempered by south and west winds. The climate is marked by sudden changes. The mean winter temperature is 31°, summer 76°. The mean temperature at Indianapolis is 52°. The average annual rainfall is 43.32 in.

Mining.—Indiana produces a greater quantity of natural gas than any other state. It was discovered in 1886 in Delaware county, and is obtained from a field 2,500 sq. m. in extent. In the production of petroleum it ranks fourth; in coal, sixth. The coal region extends from Warren county to the Ohio river, occupying about 7,000 sq. m. Several varieties of excellent building stone are quarried in various sections. The value of the annual output of gas, petroleum, coal and stone is many millions of dollars. Among other minerals are fire-clay, porcelain clay, bismuth, lead, lithographic stone, slate and zinc.

Agriculture.—Agriculture is the occupation of more than half the people of Indiana. The smoothness of the surface renders cultivation easy and permits the use of improved machinery and methods. Much under-drainage by tiling has been done, and the use of open ditches has made even marsh lands in the northwest productive. The drift plains and river valleys yield large crops of cereals, forage, flaxseed and potatoes. Gardening is followed to a considerable extent all over the state, and fruits, such as apples, peaches, pears, cherries and grapes are produced in abundance in the southern part. The raising of live stock is a leading industry in the central and southern counties.

Manufactures.—Owing to the great extension of railways in Indiana and the discovery of natural gas, the manufacturing interests have increased rapidly during the last ten years. The leading industry, according to the census of 1900, was slaughtering and meat-packing. Other industries in the order of their importance are the manufacture of flour and grist-mill products, liquors, lumber and timber products, iron and steel, glass, carriages and wagons, railroad shopwork, cars, furniture and agricultural implements. Indianapolis is the largest manufacturing center.

Transportation.—Indiana has nineteen trunk lines running east and west, and seven north and south, with many tributary lines, making a total length of about 7,000 m. The principal roads are the Big Four, Grand Trunk, C. & E., L. S. & M. S.; Wabash, C. & E. I., and C. H. & D. The Ohio river is navigable throughout its length. The Wabash & Erie Canal has 375 m. in Indiana. Indiana has one port of entry, Michigan City, and two ports of delivery, Evansville and Indianapolis.

Education.—The permanent school fund of Indiana is one of the largest held by any state. The state maintains a normal school at Terre Haute, the state university at Bloomington, and in connection with the general government and an endowment from Mr. John Purdue, the state college of agriculture and mechanical arts (Purdue University.) Other institutions of higher learning are, De Pauw University at Greencastle, Wabash College at Crawfordsville, Notre Dame near South Bend, Valparaiso Normal School at Valparaiso and Rose Polytechnic Institute at Terre Haute. The principal state institutions are a hospital for the insane and a school for the deaf, dumb and blind at Indianapolis, and the Soldiers' Home at Knightstown.

History.—The first permanent white settlement in Indiana was made at Vincennes (1727) by emigrants from Canada. But as early as 1684, La Salle had made explorations in the Ohio and Wabash valleys, and early in the eighteenth century trading and military posts, missions and settlements had been made at several points. The territory constituted a part of New France until 1763, when it was ceded to England. By the treaty of 1783, it became a part of the United States. In 1809, Indiana became a territory with its present limits. In all this period the Indians had been troublesome. In 1811 they were defeated by Gen. Harrison at the battle of Tippecanoe, and soon sued for peace. Indiana became a state in 1816, and in 1825 Indianapolis was made the capital. The principal cities with their population (1900) are: Indianapolis, 169,-164; Evansville, 59,007; Fort Wayne, 45,115; Terre Haute, 36,673; South Bend, 35,999; Michigan City, 14,850.

Indianapolis, county seat Marion co., Indiana, and state capital, is 110 m. n.w. of Cincinnati. It is popularly called the "Railroad City." The most important lines are: Pennsylvania, Big Four, C. I. & W., each with numerous branches; Lake Erie & Western; Monon (C. I. & L.) These roads run in from every direction and all enter the Union depot.

Recently several inter-urban electric lines have been built, reaching out 40 to 100 m. and connecting with Dayton, Cincinnati and other neighboring cities. The city has very large cold storage plants, breweries, flouring mills, grain elevators, agricultural implement works, iron and steel foundries; musical instrument, toy, bicycle, starch, glue, cotton and woolen goods, terra cotta and extensive electrical supply factories; large publishing houses, engine works and buggy companies. Indianapolis was founded in 1820, for the express purpose of making it the capital city. It is now the leading manufacturing city of the state and owes its commercial importance to its railroads, its situation in the great corn belt and its proximity to the natural gas belt. Indianapolis is beautifully laid out about a circle in which is the fine soldiers' and sailors' monument. The streets diverge from the center as the spokes of a wheel. The city has several parks and handsome bridges. Its public schools are famous for their excellence.. It is the seat of Butler University, has a first-class public library and numerous handsome buildings. A new public building to cost nearly $3,000,000 is soon to be erected. The old U. S. Arsenal is being replaced by a National Technical School. Pop. 1900, 169,164.

Indiana University, a State institution at Bloomington, Ind., chartered as a university in 1838. It comprises collegiate, law and graduate departments. It also maintains a summer school and a biological station on Winona Lake. In 1904 there was a faculty of 70 and 1,469 students. The library contains over 40,000 volumes. The president is Wm. L. Bryan.

Indian Architecture comprehends a great variety of styles, among which we may distinguish, as the most important, the Buddhist style, the Jaina style, the Dravidian or style of Southern India, the Chalukyan style, the Modern Hindu or Indian Saracenic style. Among the principal forms of Buddhist architecture are the following: First, the *topes, stupas*, or towers built to mark some sacred spot, and the *Dogobas*, constructions of a similar nature, containing relics of Buddha or Buddhist saints. These buildings generally consisted of a circular stone basement, varying from 10 or 12 to 40 ft. in height, and from 40 to 120 ft. in diameter, on which rose a rounded domical structure, generally of brick or small stones laid in mud, the whole edifice rising sometimes 50, sometimes 100 ft. high. Second, the rock-cut *chaitya halls* or churches, and the *viharas* or monasteries. Most of these are found in the Bombay Presidency. In rock-cut buildings architectural skill is confined to the façade and the interior, which are generally cut out with most beautiful and perfect detail. The Jaina style is a development or corruption of the pure Buddhist. The Dravidian style is that of the peoples of Southern India. The Indian Saracenic style is a general name for a number of somewhat varying styles, the result of the mixture of Saracenic principles of architecture, brought with them by the Mohammedan conquerors of India, and the distinctive architectural features of the different localities where they settled. Under the Mogul emperors in the sixteenth century were erected some most magnificent buildings, such as the tomb of Humayun Shah at Old Delhi; that of Akbar at Secundra; the palaces of Shah Jehan at Agra and Delhi; and the Taj Mahal, built by the same monarch at Agra.

Indian Ocean, that great body of water which has Asia on the n., the Sunda Isles and Australia on the e., Africa on the w., and the Antarctic Ocean on the s. The Cape of Good Hope and the southern extremity of Tasmania may be considered its extreme southern limits on the w. and e. Its length from n. to s. somewhat exceeds 6,500 mi., its breadth varies from 6,000 to 4,000 mi. It is traversed by the equatorial current flowing e. to w., and its navigation by sailing vessels is more or less modified by the periodic trade-winds and monsoons. Its greatest known depth is 3,080 fathoms.

Indians, AMERICAN, the collective name given to the tribes inhabiting the continent at the time of the discovery by Columbus, and to such of their descendants as still survive. The name of Indians was first given to these races from the notion that the newly discovered continent formed part of India. The Eskimo or Innuit, the most northerly of these tribes, extend across the continent along the Polar Sea. Next below them are the allied Kenai and Athabascan groups, the former represented chiefly by the Yellow Knife or Atna tribe on the Yukon River. The Athabascans are chiefly found between Hudson's Bay and the Rocky Mountains, but include besides the Chippewas, Coppermine, Dogrib, and Beaver Indians; the Tlatskanai, Unkwa, and Hoopah Indians of the Oregon coast; the Navaho tribe of the highlands of New Mexico; the Apaches, ranging from the Western Colorado to Chihuahua and Coahuila; and the Lipani, north of the mouth of the Rio Grande del Norte. Canada and the U. S. east of the Mississippi were formerly inhabited by the Algonquin-Lenappe and the Iroquois, generally at war with each other. The extreme west of the Algonquin region was occupied by the Blackfeet Indians; the Ojibeways held the shores of Lake Superior; s. and w. of Hudson's Bay were the Crees. The Leni-Lenappe section of the Algonquin-Lenappe group comprised the five nations of the Delawares, including the Mohicans. The Iroquois included the Senecas, Cayugas, Onondagas, Oneidas, and Mohawks, who formed a league of five nations, afterwards joined by the Tuscaroras. The Hurons were of the Iroquois group. The Dacotah or Sioux group occupied the plains between the Rocky Mountains and the Mississippi as far south as Arkansas, and included the Assiniboins, Winnipegs, Iowas, Omahas, Osages, Kansas, Arkansas, Menitarees, Crows, and Mandans. West of the Mississippi also were the Pawnees and Riccaras about the Nebraska or Platte River, and to the s.e. were the Choctaws and Chickasaws. In the Rocky Mountain regions were the Shoshone or Snake Indians, including the Comanches and others. The Cherokee tribes, which inhabited South and North Carolina

formed a detached group, and the Texas Indians were comprised in many small and diverse tribes. Below these, in New Mexico, a more advanced and distinct family is found called Moquis or Pueblo Indians. Of the numerous families occupying Mexico the Nahuatls or Aztecs were the most powerful and civilized. The Otomis, speaking a peculiar language, were also a numerous people in Mexico. In Central America the predominating family was the Maya, including the Quichés, Kachiquels, etc. Portions of the Aztec tribes were also found in Central America. In South America the leading and more advanced families were those that made up the Peruvian Empire, among which the Inca race and the Aymaras were the chief. The Araucanians, to the south of these, in Chili, had a considerable resemblance to the Algonquins and Iroquois of North America. The remaining portions of the continent, including the great alluvial tracts of the Atlantic slope, were principally occupied by the Guaranis; but along its northern coast were found the Caribs, who spread also over the Antilles and most of the West Indian Islands. In the extreme southern part of the continent live the tall Patagonians or Tehuelches, and squalid families in some respects resembling the more debased Australians.

By some ethnologists the American Indians are considered an aboriginal and single stock; by others a mixture of Mongolian, Polynesian, and Caucasian types; and by others as derived from the grafting of Old World races on a true American race. They are generally characterized as having long, black, and straight hair, scanty beard, heavy brows, receding forehead, dull and sleepy eyes, a salient and dilated nose, full and compressed lips, and the face broad across the cheeks, which are prominent, but less angular than in the Mongolian. The facial angle is about 75° (about 5° less than the European average); the hands and feet are small and well proportioned. The complexion varies from dark-brown to almost white; a somewhat reddish tint is common. The North American Indian is described as of haughty demeanor, taciturn and stoical; cunning, brave, and often ferocious in war; his temperament poetic and imaginative, and his simple eloquence of great dignity and beauty. The Mexico-Peruvians worshiped the sun with human sacrifices and the grossest rites. Those of the U. S. and Canada believe in the two antagonistic principles of good and evil, and have a general belief in manitous, or spiritual beings, one of them being spoken of as the *Gitche Manitou*, or Great Spirit. They believe in the transmigration of the soul into other men and into animals, and in demons, witchcraft, and magic. They believe in life after death, where the spirit is surrounded with the pleasures of the "happy hunting grounds," though they have no idea that the acts of their present life can have any connection with their future happiness. They adopt a *totem* or symbol of the name or the progenitor of the family; this is generally some animal (the turtle, bear, and wolf being favorites), which is the mark of families even when expanded into tribes. No marriage rite is necessary beyond the consent of the parties and their parents; but the wife may be dismissed for trifling causes, and polygamy is allowed. In ancient times the body was covered with furs and skins according to the seasons, but now the white man's clothes and blanket have generally superseded the native dress; though the moccasin of deer or moose hide; and in the wilder tribes the ornamental leggings and headdresses are largely retained. Their dwellings are made of bark, skins, and mattings of their own making, stretched on poles fixed in the ground. Their arms consist of the bow and arrow, the spear, tomahawk, and club, to which have been added the gun and knife of the whites. Canoes are made of logs hollowed out, or of birch bark stretched over a light frame, skillfully fastened with deers' sinews, and rendered water tight by pitch. The antiquities found in Mexico and Peru, and the ruins of elaborate buildings in Central America, prove that the semi-civilized races there existing had made considerable progress in sculpture and architecture. The number of Indians in the British possessions is about 130,000, in the U. S. 237,196, in Central America 1,500,000, and in Mexico 4,000,000, in all North America somewhere about 6,000,000. In South America their number is probably about 10,000,000, many of them being more or less civilized and professing Christianity.

Indian Territory, a tract of country in the U. S. definitely set apart for the Indians. It is bounded on the n. by Kansas and Oklahoma, on the e. by Missouri and Arkansas, on the s. by Texas, and on the w. by Oklahoma. It has a total area of 31,400 sq. mi. The surface is generally level except in the south and southeastern parts where there are numerous ranges of hills rising to an altitude of 1,500 ft. These form a part of the Ozark Range, which extends into Missouri and Arkansas. The principal rivers are the Arkansas, the Canadian, and the Red River. Other less important streams are the Mosho, the Salt, and the North Fork, a tributary of the Canadian.

Climate.—The climate is very salubrious. The mean annual temperature is to some degree lower than in the same latitude east of this point, while the variations of kindred seasons are yet more marked. The mean temperature at Fort Gibson is 61°.

Vegetation.—In the eastern portion the soil is fertile and well watered. Agriculture is the leading industry. The Indian farmers raise live stock and cultivate hay and grain chiefly. Most of them own their farms. In the western portion the land lies in one vast treeless slope, dry, and needing irrigation to cultivate crops successfully. Between these two regions there runs from n. to s. a belt of timber from 60 to 70 m. wide. Many varieties of fruits and vegetables are cultivated in the eastern portion of the territory and many of the civilized Indians own valuable farms.

Mining.—As yet little is known of the geology of the country, but it is highly probable that

the Ozark hills contain precious metals. It is also thought there are extensive deposits of coal in other parts of the country.

Manufactures.—In 1900, the value of manufactures in the territory was $2,624,265.

Education.—The territory is well supplied with common schools, each tribe relying upon its own resources in this respect. The Indian University near Muscogee was founded by the Baptist Indians in 1880 and is in a flourishing condition. Many of the tribes send students to different educational institutions all over the country.

History.—The Indian Territory was part of the French possessions which the U. S. procured by the Louisiana purchase in 1803. The first Indians to settle here were the Creeks, Cherokees, Chickasaws, and Choctaws in 1834. The various tribes have their own governments, some having a representative democracy, while the control of others is vested in a patriarchal or tribal form of government. The school systems are under the control of the Interior Department, working under a U. S. superintendent of schools. The principal towns with population in 1900 are: Tahlequah, the capital, 1,482; Ardmore, 5,681; and South MacAlester, 3,479. Pop. 1900, 391,960; of these 36,853 are negroes and 52,500 Indians.

India Rubber, a peculiar elastic substance composed of carbon and hydrogen, found in suspension in the milky juice of many different families of plants. The crude rubber is usually prepared where the juice is collected, by drying the juice over a fire or in the sun in molds of clay, paddles, or lasts; by evaporating the juice in the sun and removing the successive pellicles formed on the surface; or by coagulating the juice, as in Nicaragua, by an application of the juice of the bejuca vine, and kneading and rolling the coagulated mass. Most of the rubber of commerce is derived from South America, Pará, Central America, Mexico, Carthagena, etc.; smaller quantities from Java, Penang, Singapore, Assam, and South Africa. The purest comes from Pará in large bottles and thick plates. In Europe the first important practical applications of it are associated with the names of Mackintosh, the patentee in 1823 of a waterproofing process by the solution of the gum in oil of turpentine and alcohol, and in coal tar naphtha. Since then its uses have been multiplied so rapidly that it is employed in every department of industry. Thus apart from its use in blocks and sheets, etc., in tapes or threads for weaving into elastic tissues, and as varnish for waterproofing, it is employed, in combination with other resinous materials in a solvent such as naphtha, as a cement or marine glue. When combined with a small quantity of sulphur, etc., it is used for the manufacture of overshoes, boots, gloves, life preservers, gas bags, steam and water packing, belting, fire hose, tubing, springs, tires, artificial sponges, etc. With a larger portion of sulphur, and cured or vulcanized by exposure to a high temperature, it is used for the manufacture of combs, pen and pencil holders, rulers, inkstands, buttons, canes, syringes, jewelry, and when colored with vermilion, for mountings for artificial teeth, etc. In combination with asphalts, oils, and sulphur, etc., and vulcanized (*kerite*) it is used for covering telegraph wires.

Indiction, in chronology, a period or cycle of fifteen years, supposed to relate to some judicial acts, probably the publication of tariffs of the taxes, which took place at stated intervals under the Greek emperors. Three sorts of indiction are mentioned: 1, the Cæsarean, which fell on the 8th of the calends of October, or 24th of September; 2, the indiction of Constantinople (beginning A. D. 312), on the 1st of September; and 3, the Pontifical or Roman, which begins on the calends of January. We find ancient charters in England dated by indictions.

Indictment (in-dīt'ment), in law, a written accusation of one or more persons for a crime or misdemeanor, preferred to and presented upon oath by a grand jury to a court. Indictments must have a precise and sufficient certainty.

In'digo, a blue vegetable dye, extensively employed in dyeing and calico printing; an

Indigo Plant; *a.*—Seed Pods.

important commercial product in the East and West Indies. Mexico, Brazil, Egypt, etc. It is chiefly obtained from various herbaceous or shrubby plants, with small, blue, purple, or white pea-shaped flowers. They are very numerous in the equatorial regions of the globe. The species most commonly cultivated are the *I. Anil*, a native of tropical America, but now cultivated also in the East Indies; the *I. tinctoria*, also cultivated in both Indies; and the *I. cærulea*. The *I. tinctoria* is the species most abundantly cultivated. The greater part of the indigo at the present day comes from India, especially from the provinces of Bengal, Oude, and Madras. The ground is plowed toward the end of the year, and the seed sown in the early spring of the following year. The first cutting of the plants takes place about midsummer, and the second about two months later, the process of extracting the dye varying as the leaves are fresh or dried. Indigo occurs in the market in pieces which are sometimes cubical, sometimes of an irregular form; these pieces are easily broken, the fracture being dull and earthy. The color varies from light-blue to blackish-blue; when rubbed with the

nail a copper-colored streak is formed on the surface of the mass. Indigo is insoluble in water, but when exposed to the action of certain deoxidizing agents it becomes soluble in alkaline solutions, losing its blue color and forming a green solution from which it is precipitated by acids white, but it instantly becomes blue on exposure to the air. Commercial indigo contains about 50 to 60 per cent. of pure indigo blue, the remainder consisting of substances called indigo gluten, indigo yellow, indigo red, etc.

In'dium, a metal discovered by Reich and Richter in 1863 by means of spectroscopic analysis in the zinc-blende of Freiburg. It has been isolated in small quantities, and is of a silver-white color, soft, and marks paper like lead. The metal is related to cadmium and zinc, and its spectrum exhibits two characteristic lines, one violet and another blue.

Indo-China, a name sometimes given to the southeastern peninsula of Asia, comprising Burma, Siam, Cambodia, Cochin-China, Tongkin, Anam, etc.

Indo-European Languages, also called Aryan or Indo-Germanic, the most important of the great families into which human speech has been divided, spoken by various peoples in Asia and Europe. The chief branches of this family are the Teutonic or Germanic, including English, German, Dutch, Danish, Swedish, Icelandic, and the extinct Gothic; the Slavonic (Polish, Russian, Bohemian); the Lithuanian; the Celtic (Welsh, Irish, Gaelic, Breton); the Latin or Italic, and the Romance tongues descended from it (French, Italian, Spanish, Portuguese); the Greek, the Armenian, the Persian, and the Sanskrit. All these tongues are regarded as being descended from a common ancestral tongue or parent speech, spoken at some remote period in Central Asia, whence the ancestors of the modern peoples speaking these tongues spread into India, Western Asia, and Europe.

Indore (or Indor), a protected native state of Hindustan, connected with Central India, and consisting of several detached portions, the largest being bisected by the Narbada; total area 8,400 sq. mi. The ruling class are Mahrattas. The Holkar dynasty was founded by Mulhar Rao in the early half of last century. Their dominions were at one period much more extended than at present. Pop. 1,054,237. Indore, the capital, is of modern origin, and in recent times has rapidly increased. The Maharajah's palace is the most conspicuous edifice. The British residency is one of the handsomest in Hindustan. Pop. 75,401.

Indra, a Hindu deity, originally representing the sky or heavens, and worshiped in the Vedic period as the supreme god, though he afterward assumed a subordinate place in the Pantheon. He is commonly represented with four arms and hands riding on an elephant. When painted he is covered with eyes. He is at once beneficent as giving rain and shade, and awful and powerful in the storm as wielding the thunderbolt. In one aspect he is lord of *Swarga,* the beautiful paradise where the inferior gods and pious men dwell in full and uninterrupted sensuous felicity.

Indre (andr), a department of Central France; area 2,622 sq. mi. A considerable quantity of land is occupied by vineyards. The minerals include iron, lithographic stones, and several varieties of marble. The principal manufactures are fine woolen cloth, and iron and steel goods, linen, hosiery, etc. Châteauroux is the capital. Pop. 296,147.

Indre-et-Loire (andr-e-lwär), a department of Central France; area 2,362 sq. mi. Hemp and flax are extensively cultivated, and fruit is very abundant. Iron is worked to some extent; and there are valuable millstone quarries. Clay, both for ordinary purposes and the finer kinds of pottery, is abundant. The manufactures are not of much importance. Tours is the capital. Pop. 340,921.

Induced Current, the current of electricity which is produced or excited in a conductor when the magnetic field in which it is placed is altered in any way; that is, 1, when the strength of the current in a neighboring conductor is altered; or 2, when a neighboring conductor in which a current flows is altered in position; or 3, when a neighboring magnet is moved; or 4, when the magnetization of a neighboring magnet is altered. Thus if there is a closed circuit, say a coil of wire with its ends joined, through which no current is passing, the motion of a magnet in its neighborhood will induce a current in it, the direction of this current being always such as to oppose the motion.

Induction, in logic, is that process of reasoning by which we rise from the particular to the general, and is the counter-process to deduction. In induction particulars are not only raised into genera's, but these into still higher generalities. In following this method we proceed from the known to the unknown, and obtain a conclusion much wider than the premises. Thus a person who has had any experience easily arrives by induction at the conclusion that fire burns wood, and when any piece of wood whatever is presented to him he will have no hesitation in saying that fire will burn it. As it is impossible that all particulars can be observed, there is always a certain risk of error, and the inductive method must be worked with extreme caution; but science properly so called would be impossible if we did not presuppose a faculty of arriving from experience at the knowledge of truths not contained in that experience. Hence the ground of induction is the established fact that nature is uniform.

Induction, ELECTROSTATIC, the action by which the distribution of a charge of electricity on a conductor is altered by the approach of an electrified body. When a body charged with one kind of electricity is approached toward an insulated conductor which originally had no charge, a charge similar to that of the influencing body is produced on the remote side, and an equal charge of the opposite kind on the near side of the insulated conductor. It is to the mutual induction between the two

coatings, one charged positively, and the other negatively, that the Leyden jar is indebted for its large electrical capacity.

Induction, MAGNETIC, the action by which iron and other substances become magnetic when in a magnetic field, that is, when in the neighborhood of magnets or currents of electricity. See *Electro-Magnetism*, *Magnetism.*

Induction Coil, an instrument invented by Ruhmkorff, in which rapid breaking and making of the current of electricity in a primary short coil of wire gives rise to a succession of induced currents of very great electromotive force in a long secondary coil. Such a coil often consists of a copper wire many miles in length, and a succession of powerful sparks passes between its terminals when the primary current is rapidly made and broken.

Indus, the chief river of the northwest of Hindustan. It has a length of about 1,800 mi., drains an area of about 370,000 sq. mi., and rises in Thibet on the north of the Himalaya Mountains. Its delta extends about 130 mi. along the coast. Vessels drawing more than 7 ft. cannot generally enter any of its mouths; but steamers of light draught ascend from Haidarabad to Multan.

Infant, a term in the English and American law for persons who have not attained their *majority*, that is, the age of twenty-one years, and are under guardianship. In general, contracts made by infants are not binding, except for necessaries suited to their state in life. Being an infant is no bar to criminal proceedings; but young persons are not punished for offenses if they have not knowledge and discretion to distinguish them to be such. Infants require the consent of parents or guardians to marry. The jurisdiction in respect to infants is generally vested in either probate or orphans' courts. These courts appoint guardians to take charge of the property of infants, and, in case of the decease of the father, to take charge of their persons; but during the life of the father he has the guardianship and control of the persons of his children until they are twenty-one years of age.

Infant'icide, the murder of an infant, a crime that is especially common in the case of illegitimate children, the main cause being shame; but infanticide is sometimes the result of puerperal insanity. In trial for infanticide it must be proved that the child was fully born alive. Infanticide was prevalent in Greece and Rome. In modern times many barbarous nations are guilty of wholesale child murder. Among the South Sea Islanders and aboriginal Australians the destruction of infant life is systematized. The Hindus destroy female children without compunction, and abortion is common among the Mohammedans. In China, also, infanticide is supposed to be frightfully common.

Infant Schools, schools, the object of which is to amuse, interest, and instruct children from their third to their sixth year. Jean Frédéric Oberlin, Protestant pastor of Waldback, in Alsace, is regarded as their founder. In Germany there are numerous *Klienkinderschulen*, or *Kindergärten;* in France, under the name of "Asylums," they are widespread; and the *Kindergärten* system (founded about 1840) is acquiring high credit both in Great Britain and in the U. S.

Influen'za (Italian, influence), a term used to denote an epidemic catarrh of a rather severe character, the symptoms of which are those of what is usually called a cold, with others such as lassitude and general depression, loss of sleep, feverishness, nausea, loss of appetite, sometimes vomiting, often an inflammatory state of the throat and pharynx, bronchitis, or other complications. It is not usually fatal, the patient generally recovering in a week or ten days, but it sometimes leaves behind chronic bronchitis or consumption. It has at various times spread more rapidly and extensively than any other disorder.

Information, in law, a complaint or accusation exhibited against a person for some criminal offense. It differs in no respect from an indictment, except that it is filed at the mere discretion of the proper law officer of the government, *ex officio*, without the intervention of a grand jury. The process has not been put in motion by Congress for misdemeanor, but is common in civil prosecutions, for penalties and forfeitures. The information is usually made upon knowledge given by some other person than the officer, called the *relator*. The term also denotes a written statement made on oath before a justice of the peace previous to the issuing of a summons or complaint against a person.

Informer, in law, a person who informs or prefers an accusation against another, whom he suspects of the violation of some penal statute. When the informer is entitled to the penalty or part of the penalty, upon the conviction of an offender, he is, or he is not, a competent witness, according as the statute creating the penalty has or has not made him so.

Infusoria, a class of minute, mostly microscopic animals, so named from being frequently developed in organic infusions, provisionally regarded as the highest class of the Protozoa. They are provided with a mouth, are destitute of pseudopodia, but are furnished with vibratile cilia. Most are free-swimming, but some form colonies by budding, and are fixed to a solid object in their adult condition. The body consists of an outer transparent cuticle, a layer of firm sarcede called the cortical layer, and a central mass of semiliquid sarcode which acts as a stomach. A nucleus, which is supposed to be an ovary, having attached to its outside a spherical particle called the nucleolus, and supposed to be a spermatic gland, is imbedded in the cortical layer. Contractions of the body are effected by sarcode fibers. The cilia, with which most are furnished, are not only organs of locomotion, but form currents by which food is carried into the mouth. Reproduction takes place variously. They are divided into three orders, Ciliata, Suctoria, and Flagellata, in accordance with the character of their cilia or

contractile filaments. Many of the organisms formerly included among Infusoria are now regarded as vegetable.

Ingalls, JOHN J., b. in Massachusetts in 1833. He was graduated from Williams College at the age of 22, and admitted to the bar two years later. He went to Kansas in 1858, became secretary of the state senate in 1861, and a member of that body in the year following. He was elected a member of the U. S. Senate in 1873, and re-elected in 1879 and 1885, and was president pro tem. of the senate during the last term. Died Aug. 16, 1900.

Ingelow (ing'ge-lō), JEAN (1830–97), English poetess. In 1863 she published a volume of poems, which ran through fourteen editions in five years, and her popularity has since increased both through her prose writings and her poetry. In prose she has written novels and tales for children, including *Mopsa the Fairy, Studies for Stories, Off the Skelligs, Sarah de Berenger, Don John,* etc.

Ingersoll, ROBERT G., b. in Yates co., N. Y., in 1833. He began the practise of law in 1857 in Illinois, and in 1862 was made colonel of the eleventh Illinois cavalry. He was appointed attorney-general for Illinois in 1866. He is principally known on account of his lectures and books, his subject generally being the Bible and the Christian religion, although he has written several lectures upon various authors and their works. Among his books are, *The Gods, and other Lectures; Some Mistakes of Moses,* etc. He died July 21, 1899.

Ingria, a district of Russia, forming a part of the government of St. Petersburg, in which the capital, St. Petersburg, is situated, but at one time belonging to Sweden.

Inhaler, an apparatus for inhaling vapors and volatile substances, as steam of hot water, vapor of chloroform, iodine, etc. It consists of a tin can containing a small spirit lamp, and above this is a small kettle for hot water, the steam of which is driven out with some force when the apparatus is used. Attached to the can is a receptacle for receiving a small phial containing the substance whose vapor is to be inhaled, this being drawn off and forced through the funnel by steam.

In'ia, a genus of Cretacea belonging to the dolphin family, containing only one known

Inia.

species, remarkable for the distance at which it is found from the sea, frequenting the remote tributaries of the river Amazon, and even some of the elevated lakes of Peru. It has bristly hairs on its snout, and is from 7 to 12 or 14 ft. long.

Injunction, in American law, a writ which issues under the seal of a court of equity, to restrain proceedings in other courts. Injunctions are both common and special. It is either *provisional,* until the coming of the defendant's answer, or *perpetual,* that is, perpetually restraining the defendant from the commission of an act contrary to equity. Disobedience to an injunction constitutes contempt of court, and is punishable accordingly.

Ink, a liquid or pigment used for writing or printing. All ordinary writing inks owe their properties to the presence of gallate or tannate of iron held in suspension by means of gum. Gallnuts contain gallotannic acid, which gives a black precipitate with persalts of iron; they also contain pectose, which converts gallotannic acid, when exposed to the air, into gallic acid. This latter acid colors ferric salts a much deeper black than the former acid. The essential points in the preparation of a good writing ink are therefore the presence of an iron salt, an infusion of gallnuts and gum, and the allowing the mixture to remain for some time exposed to the air. All other substances which are added to ordinary ink as coloring matter in the place of gallnuts only impair its quality. As ink is liable to become moldy it is customary to add a small quantity of such substances as essential oils, carbolic acid, crushed cloves, or sometimes corrosive sublimate, in order to prevent this result. For *copying ink* a little sugar is added, which prevents it drying rapidly and perfectly. The so-called *alizarin inks* differ from ordinary inks in containing a little free acid, and usually also a small quantity of indigo dissolved in sulphuric acid, which prevents too pale an appearance in writing. Such inks become very black by exposure to ammoniacal fumes. Ink is sometimes prepared in cakes or powder, which when dissolved in water may be used as ordinary ink; the thickening ingredients added are usually madder and indigo dissolved in sulphuric acid. Colored writing inks, as red, blue, etc., are simply solutions of some coloring materials, cochineal and Brazil wood being used for red, Prussian blue for blue, etc. Gold and silver inks consist of a fine powder of the metals suspended in a solution of gum arabic. *Marking ink* usually consists of a solution of silver nitrate thickened with gum and sometimes colored by means of sap green. *Printing ink* may be made by boiling linseed oil and burning it about a minute, and mixing it with lampblack, with an addition of soap and resin. If it be wished to obtain colored printing inks, this may be done by adding the necessary pigments to the oil while it is being heated. Vermilion is used to give a red color, ultra-marine for blues, and lead chromate for yellows. *Lithographic ink,* used in printing from the stone, is usually composed of virgin wax, dry white soap, tallow or lard, shellac, mastic, and lamp or Paris black. *Sympathetic inks* have been sometimes used in secret correspondence. They are of various

kinds. For instance, characters written in solutions of cobalt, lemon juice, and dilute sulphuric acid make no appearance on the paper, but become visible when treated with some other solution or exposed to the action of heat.

Inkermann, a town of Russia, government Taurida, in the Crimea, at the head of Sebastopol harbor. It is famous for the signal victory of the allies in the Crimean War over the Russians on Nov. 5, 1854.

Inness, GEORGE (1825–1894), landscape painter, was born in Newburg, N. Y. No painter has represented the aspects of nature in the American climate with deeper feeling, or a finer sentiment of light and color. His *American Sunset* was selected as a representative work of American art for the Paris Exposition of 1867. His pictures were exhibited at the Paris Exposition of 1900.

Innocent, the name of thirteen Popes. INNOCENT I, a cardinal deacon created by St. Damascus, was elevated to the Pontificate near the close of 401. In the same year he went to Ravenna in relation to the capitulation between King Alaric and the Senate of Rome. The following year the city was plundered by the Goths, but Innocent, after their departure, undertook to repair the ravages they had perpetrated and redecorate the churches they had despoiled. He espoused the cause of St. Chrysostom, who had been unjustly deprived of the See of Constance. He governed the Church with exceeding benefit for over 15 years and after his death was canonized. INNOCENT II (Gregorio de Papareschi) was Pope from 1130 to 1143. He was opposed by a faction of the cardinals who set up Anacletus II as antipope. In 1133 he was installed in the Lateran at Rome by the Emperor Lothair, but did not gain undisputed possession before the death of Anacletus in 1138. In 1139 he held the second Lateran Council and confirmed the condemnations pronounced by several previous councils on Abélard and the followers of Brescia. INNOCENT III (Giovanni Lothario Conti), Pope from 1198 to 1216, the greatest Pope of the name. After a distinguished career as a student at Rome, Paris and Bologna he was made cardinal and eight years later, at the age of thirty-eight, became Pope. The chief aim of his ecclesiastical policy was to vindicate the papal claim of the supremacy of the Church over the State. He began with the restoration of the Papal authority in Rome, but soon extended his influence to all parts of Europe. He forced Philip Augustus of France to take back his repudiated Queen; instituted the fourth crusade, which resulted in the capture of Constantinople from the Greeks and the establishment of the Latin Empire; compelled John of England to acknowledge the feudal sovereignty of the Pope and pay an annual tribute; instituted the crusade against the Albigenses in 1208, and presided at the celebrated Lateran Council in 1215. He was, moreover, an energetic worker for public and private morality and lent his influence to the advancement of every good cause. He died in 1216 while busily engaged in promoting peace among the Italian cities. INNOCENT XI (Benedetto Odeschalchi), who was Pope from 1676 to 1689, was an energetic and judicious reformer. Throughout his pontificate, he was involved with Louis XIV in conflicts of which the most serious arose when the Pope attempted to put an end to the King's practice of keeping sees vacant and appropriating their revenues. The French clergy expressed their views of the matter in their *Four Propositions of the Gallican Clergy.* INNOCENT XII (Antonio Piguatelli), Pope from 1691 to 1700. After filling a number of important diplomatic posts, he was made a cardinal by Innocent XI. He was elected to the Papacy after a session of the conclave lasting nearly six months. He brought about a reconciliation with France after the French clergy had retracted the "four propositions."

Innocents, FEAST OF HOLY, variously styled Innocents' Day, and Childermas, a festival observed in the Western Church (including the Anglican) on the 28th and in the Eastern Church on the 29th of December, in commemoration of the massacre of the children of Bethlehem by the order of Herod.

Innsbruck, the capital of the Austrian Crownland of the Tyrol, situated in the Alps at an elevation of nearly 1900 feet. The city lies on both banks of the Inn, in a broad valley surrounded by high mountains, and is a favorite resort of travelers. The town is very old. It received municipal privileges from Otho I in 1224. From 1363, when Tyrol was annexed to Austria, until 1665, Innsbruck was for the most part the residence of the Tyrolese rulers of the House of Hapsburg. The old town lies on the right bank of the Inn and is connected with the new town by three iron bridges. There are many interesting old buildings in the city, one of them being the oldest Capuchin monastery in Austria, dating from 1598. The Franciscan Church contains a magnificent monument to Maximilian I, several monuments to Tyrolese patriots and a beautiful silver statue of the Virgin. The Jesuit Church and the Parish Church, with its quaint old churchyard, are also interesting. Among other noteworthy features are a fifteenth century palace, known as the *Goldene Dachl*, the Imperial Palace, the Ottoburg, dating from the thirteenth century, and the Tyrolese National Museum; the monument to Walter von der Vogelweide, the historic and beautiful Isel Mountain, with Natter's bronze statue to Andreas Hofer, and the famous medieval Ambras Castle, with its great collection of weapons. Innsbruck is the seat of a university founded in 1667 by Leopold I, and also of the Governor and of the Court of Appeals for Tyrol and Vorarlberg. The chief industries are cotton and wool spinning, glass painting and the mauufacture of mosaics. Pop. 1900, 27,056.

Inoculation, in medicine, the introduction, by a surgical operation, of a minute portion of infective matter into contact with the true skin, for the purpose of exciting artificially a

milder form of some contagious disease, and thereby protecting the human system against similar attacks in future; keeping in mind, however, that such a process can be only of efficacy in regard to diseases which attack us only once in the course of our lives, such, for instance, as smallpox. The term is chiefly used in connection with smallpox.

Inquisition, The, an ecclesiastical court in the Roman Catholic Church, officially known as the Holy Office for the discovery and suppression of heresy. In the early ages of Christianity civil as well as ecclesiastical government was intolerant of the propounders of heresy and those who adopted it. A person suspected or discovered to be guilty of heresy was liable to be arrested and detained in prison to await trial by the judges. The proceedings were usually conducted secretly. The suspect had the right to make known his enemies, whose evidence would thereupon be excluded. A confession of guilt was sometimes extorted by torture, but such a confession in order to be accepted had to be repeated afterwards without torture. As a punishment those convicted had to make pilgrimages or to wear some badge, as the yellow cross, as a mark of disgrace, or were sentenced to imprisonment and in extreme cases to death. The death penalty could, however, be inflicted only by the State and was resorted to in comparatively few cases. Thus between 1308 and 1322 out of 636 persons convicted of heresy only 40 were condemned to death.

From the time of Constantine the doctrines of the Church were regarded as the basis of social order and the bulwark of thrones. Those who opposed them were therefore regarded as the enemies of both. A ruler was required to enforce the laws of the Church as part of his duty as a Christian. If he refused to do so, he might be excommunicated or even deposed. After the formation of the Nicene Creed, Constantine made strenuous efforts to suppress all dissent from the principles laid down therein. He punished the Donatists with fines and confiscation and caused the books of the Arians to be burned. His successors for several centuries coöperated with the bishops in discovering and punishing heresy. The measures resorted to were usually mild and yet quite effective. In the East from 385 heresy was legally punishable by death, but this sentence was seldom delivered. Peter of Aragon in 1197 was the first Western ruler to decree the death sentence. In the twelfth and thirteenth centuries, the spread of certain heretical sects—as the Albigenses and Waldenses—roused the Church to a realization of the necessity of increased vigilance. Finally a permanent court was instituted whose duty it was to deal with this branch of the work of the Church.

In Spain the Inquisition developed into an organization whose work is generally condemned by Protestants and Catholics alike. There are, however, those who are inclined to defend it and hold that the facts have been grossly misrepresented in history. One concession must in all justice be made—that many of the cases tried by the Spanish inquisition were not really heresies but rather crimes such as would now be brought into the ordinary civil courts and the punishments inflicted were probably in many cases just. An ordinary tribunal similar to those of other countries had existed in Spain from an early period. The rulers Ferdinand and Isabella, because of a Jewish plot to overthrow the government, obtained permission from the Pope to reorganize the Inquisition, reserving, however, the right of appointing the inquisitors and of controlling the entire action of the tribunal. In 1480 the Cortes sanctioned the institution and the best authorities agree that from this time on the Spanish Inquisition became a State tribunal. Its work began in 1481 and was actively conducted until the latter part of the seventeenth century. A conservative estimate places the number of executions at 4,000. The Popes endeavored to mitigate the rigor of the Spanish court's proceedings, but were unable to accomplish much with the royal tribunal. Finally in 1808, the Inquisition was suppressed, but under the Restoration it was revived. On the establishment of the Constitution in 1820 it was again suppressed, but was not finally abolished until 1834.

In Rome and the Papal States the Church never ceased from the time of its establishment to exert a watchful control over heresy, punishing it with imprisonment and civil disabilities, but rarely if ever with death. Berger says there is no instance of death for heresy at Rome and Archbishop Spalding says that it would be difficult to prove such an instance. The Congregation of the Holy Office still exists, but its chief concern now is with the suppression of heretical literature.

Insanity, a general term comprising every form of intellectual disorder, whether consisting in a total want or alienation of understanding, as in idiocy, or in the diseased state of one or several of the faculties. Medical writers have adopted different systems of classification in their treatment of this subject; but perhaps the most convenient is that which comprises all mental diseases under the four heads of mania, melancholy, dementia or fatuity, and idiocy. *Idiocy* is either a congenital or an acquired defect of the intellectual faculties. Congenital idiocy may originate from a malformation of the cranium, or of the brain itself, Acquired idiocy proceeds from a mechanical injury of the cranium, or from injury or disease of the brain, from excess in sensual indulgences, etc. *Dementia* is marked confusion of thoughts, loss of memory, childishness, a diminution or loss of the power of volition, and general weak-mindedness; it differs from idiocy in being curable. *Cretinism*, sometimes given as a separate category, is a form of idiocy associated with a characteristic malformation of the body. *Mania* is a species of mental derangement characterized by the disorder of one or several of the faculties, or by a blind impulse to acts of fury. *Melancholy* is a species of mental disorder consisting in a depression of spirits. Some dark or mournful

idea occupies the mind exclusively, so that by degrees it becomes unable to judge rightly of existing circumstances, and the faculties are disturbed in their functions. Several kinds of melancholy are distinguished; the distinctions are founded, however, mostly on the causes of the disease, among the more important of which are love, religious views, repeated failures to reach an earnestly desired end, a sudden nervous shock, and the like. The course of the disease is various; sometimes it lasts a series of years; sometimes it ceases of itself or is cured by medical aid. Very frequently melancholic patients commit suicide, a tendency that is not to be overlooked. In it also bodily health is likely to be neglected, thus leading to certain other diseases.

Insects.—The true insects are those animals of the division Arthropoda or Articulata distinguished from the other classes of the division by the fact that the three divisions of the body — the head, thorax, and abdomen — are always distinct from one another. See latter part of this article for Uses of Insects. There are never more than three pairs of legs in the perfect insect, and these are all borne upon the thorax. Each leg consists of from six to nine joints. The first of these is called the "coxa," and is succeeded by a short joint called the "trochanter." This is followed by a joint, often of large size, called the "femur," succeeded by the "tibia," and this has articulated to it the "tarsus," which may be composed of from one to five joints. Normally two pairs of wings are present, but one or other may be wanting. The wings are expansions of the sides of the second and third sections of the thorax, and are attached by slender tubes called "nervures." In the beetles the anterior pair of wings becomes hardened so as to form protective cases for the posterior membranous wings, and are called in this condition "elytra" or "wing-cases." Respiration is effected by means of air-tubes or tracheæ, which commence at the surface of the body by lateral apertures called "stigmata" or "spiracles," and ramify through every part of the body. The head is composed of several segments amalgamated together, and carries a pair of feelers or "antennæ," a pair of eyes, usually compound, and the appendages of the mouth. The thorax is composed of three segments, also amalgamated, but generally pretty easily recognized. The abdominal segments are usually more or less freely movable upon one another, and never carry locomotive limbs; but the extremity is frequently furnished with appendages connected with generation, and which in some cases serve as offensive and defensive weapons (stings). The organs of the mouth take collectively two typical forms, the masticatory and the suctorial, the former exemplified by the beetles, the latter by the butterflies, in which the mouth is purely for suction. The alimentary canal consists of the œsophagus or gullet, a crop, a gizzard, a stomach, and an intestine, terminating in a cloaca. There is no regular system of blood-vessels; the most important organ of the circulation is a contractile vessel situated dorsally and called the "dorsal vessel." The nervous system is mainly composed of a series of ganglia placed along the ventral aspect of the body and connected by a set of double nerve cords. The sexes are in different individuals, and most insects are oviparous. Reproduction is generally sexual, but non-sexual reproduction also occurs. Generally the young are very different from the full-grown insect, and pass through a "metamorphosis" before attaining the mature stage. When this metamorphosis is complete it exhibits three stages—that of the larva, caterpillar or grub, that of the pupa or chrysalis, and that of the imago or perfect winged insect. Insects have been divided into three sections, according as they undergo no metamorphosis, an incomplete one, or a complete one.

Classification.—Insects are commonly divided into the following families: The Coleoptera or sheathed-winged, like beetles, as the May beetle, Colorado beetle, etc.; the Neuroptera or nerve-winged, like the dragon-fly, and white ant; the Orthoptera or straight-winged, like the grasshopper, locust, and katydid; the Hemiptera or half-winged, like the cicada, squash bug, bed bug, plant lice, etc.; the Diptera or two-winged, like the common fly, mosquito, and flea; the Lepidoptera or scaly-winged, like the butterfly and moth; the Hymenopteras or membrane-winged, like bees, wasps, and ants.

Uses of Insects.—It is interesting to notice the great and important part played by insects in the economy of the world, and the extreme value to mankind of those insects which we are accustomed to call destructive, and to note the wonderful modifications of structure which enable the insects to fulfill their mission, and the surpassing beauty with which many of them are endowed. Many insects directly support human life by furnishing food, or being themselves eaten. Thus, bees not only furnish honey, but in several countries are themselves eaten while in the state of grubdom, together with the "bee bread" which has been laid up in the cells. Several wasp larvæ share the same fate.

The locusts, although they destroy vegetable life, are in many parts of the world invaluable in preserving animal life, by furnishing food, not only to man, but to beasts, birds, and reptiles. Termites, again, form a favorite article of food in almost every country where they are found; while in Australia, the fat-bodied butterfly popularly called the "Bugong Moth," affords nourishment to thousands of the natives, and in a few weeks changes them from starvelings into plump and contented beings. The dragon flies are employed in the same manner in the same country. Even in civilized lands insects are utilized for food. Putting aside the cheese mites and "hoppers" with which we are all familiar, we find the Mexicans employing a certain honey-gathering ant for the purpose of making mead. In Europe the common wood ant is much used in the manufacture of vinegar, and in the south of France the same insect is pressed into the

service of the pastry cook, being used to flavor a certain sort of cream called *"creme aux fourmis."*

By way of retaliation, the voracious mosquitoes are themselves eaten in some parts of the world. It is related by Livingstone, that the insects swarm in such vast multitudes on the banks of the Nyassa Lake, that they are gathered in bags and pressed into circular cakes about 1 in. thick and 7 or 8 in. in diameter. These cakes, called "kungo," somewhat resemble caviare in flavor. Larvæ, especially those of the larger beetles, form an important branch of food in many countries, and in some, as in certain parts of Australia, are absolute necessities. Among them may be mentioned the celebrated gru-gru grub of the West Indies. It is the wood-boring larva of a gigantic weevil, and when taken from the tree is held by the head and eaten alive. However repulsive the notion may appear, it has been found that when Europeans have once been induced to try the gru-gru, they have always held it as one of their best dainties. Perhaps the most curious article of insect food is the egg of one of the Mexican water boatmen. These eggs are laid in countless numbers upon bundles of reeds which are sunk for the purpose. In a fortnight the reeds are covered with eggs, which are scraped off and made into cakes under the name of "haoutle." Some of the insects are useful to man in a secondary manner by producing articles which are almost necessary adjuncts to civilization, such as the wax of the bee, the irritant juices of the blister beetle, the dye of the cochineal, and the "lac" of its near relative, the lac insect. The insect tribes play apparently so insignificant a part in the economy of the world, that few except professed entomologists have the least idea of their real importance, their vast, silent, unseen armies, and the enormous power which they wield. None but a practical entomologist ever sees one insect in ten thousand, even when they have attained their perfect state; and the most skillful naturalist can but conjecture as to the countless hosts of grubs and caterpillars that are hidden among the foliage, buried in the ground, submerged beneath the waters, burrowing under the bark or into the solid wood of trees, or leading a parasitic existence within the bodies of living animals. Insects pervade the whole of nature, and the functions they perform are so important, that they deserve from man far more attention than he generally condescends to bestow. Individually an insect is small, feeble, and, in the eyes of most persons, contemptible. Collectively, the insect tribes are a mighty host, exercising over our world an influence that excites equal wonder and admiration in the minds of those who can appreciate it. Still, important as are the insects in this country, those of tropical lands have infinitely more influence, and that for very evident reason. They have more work to do. By dint of daily increasing and improving agriculture, and by the rapid growth of population, we have so completely altered the surface of our land, that many species which were formerly abundant have utterly perished, and many others are becoming scarcer year by year.

Insects

The average traveler never thinks of observing insects for their own sakes, and only takes notice of those which annoy him. Take the first insect of which travelers unite in complaining, the hated and dreaded mosquito. In its perfect, or winged state, it is about as annoying a creature as can be; but then it must be remembered that the traveler is but a casual intruder in the natural domain of the mosquito, and must expect the consequences of his intrusion. Devouring travelers is not the normal occupation of the mosquito, for hundreds of successive generations may live and die, and not one of them ever see a human being. Their real object is a beneficent one. In their larval state they live in the water, and feed upon the tiny particles of decaying matter that are too small to be appreciated by the larger aquatic beings, and, by devouring them, purify the water and convert death into life. Even in our ponds we are much indebted to the gnat larvæ for saving us from miasma; while the vast armies of mosquito larvæ that swarm along the edges of tropical lakes and feed upon the decaying substances that fall from the herbage of the banks; purify at the same time the water and the atmosphere, and enable human beings to breathe with safety the air in which without their aid no animal higher than a reptile could have existed. The next insect plague of which a traveler complains is generally summed up in the word ants. All he knows or cares is, that some ants, which were very small, stung him, each sting feeling like the prick of a red hot needle. Some, which were very large, bit him even through his clothes, and held on with such more than bulldog tenacity, that after the bodies were torn away the heads not only retained their hold, but went on biting. Then, multitudinous ants, large, small, and middle sized, swarmed into his room or tent and ate up his provisions almost before his very eyes. If he put the legs of the table into water they made extemporized pontoon bridges of their bodies and extended legs, and so enabled the ant armies to scale the citadel, despite of the moat. If he hung his shelves from strings the ants crawled down the strings. And, if he did succeed in isolating a table by putting the legs in saucers full of oil the ants crawled up the walls, then on the ceiling, and then dropped on the table. They ate his food, they swarmed into his drink, and they tore to pieces all his birds and other specimens he had collected. But if we put aside the temporary and individual inconvenience caused to the traveler or colonist, and look to the real mission of these detested insects, we shall find that they play on the land a part like that of the mosquitoes on the water, and rank among the most important of the scavengers of the earth. Their presence is undoubtedly disagreeable to individual men, but mankind would

suffer severely if the ant tribes were to be extinguished. Scarcely has a tree fallen than the insect hosts are at work on it. First come the large and powerful wood-boring beetles and deposit their eggs upon it. Armed with their sharp and strong jaws, which act like bone nippers, the larvæ bore through and through the trunk, making tunnels like augur holes, and so rendering the tree permeable to to air and wet. Smaller beetles soon follow in the wake of the large, and bore out the softened wood, and a host of other insects set to work on the now decaying trunk, many using it as food, and others carrying it off as material for their nests. The rapidity of their work is astonishing, and in an exceedingly short time the entire tree is reduced to mere dust. The white ants are perpetually engaged in transferring to the surface of the earth the soil which they have taken from beneath it, and so continually renewing and fertilizing it with fresh soil. Apart from direct benefit or injury to man the whole of the insect tribes are working toward one purpose, namely, the gradual development of the earth and its resources. The greater number are perpetually destroying that which is effete, in order to make way for something better; while others, whose business seems chiefly to be the killing and eating of their fellow insects, act as a check to their inordinate increase, and so guard against the danger of their exceeding their proper mission. See *Mosquito*.

Insesso′res, in ornithology, the perchers or passerine birds, an extensive order of birds, comprehending all those which live habitually among trees, with the exception of the birds of prey and the climbing birds. The toes, which are three before and one behind, are specially adapted for perching and nest-building. These birds live in pairs, build in trees, and generally display great art in the construction of their nests. In them the organ of the voice attains its utmost complexity, and all our singing birds belong to the order. The form of the beak varies widely, and this has led to the establishment of four important subordinate groups.

Inspiration, in theology, is the infusion of ideas into the human mind by the Holy Spirit. By the *inspiration of the Scriptures* is meant the influence of the Holy Spirit exercised on the understandings, imaginations, memories, and other mental faculties of the writers, by means of which they were qualified for communicating to the world divine revelation, or the knowledge of the will of God.

Insterburg, a town of Prussia, province of East Prussia, 16 mi. w. from Gumbinnen, at the confluence of the Angerap and Inster, which here form the Pregel. It has iron foundries, distilling, brewing, manufactures of linen, leather, and earthenware, etc. Pop. 20,914.

Instinct, the power by which, independently of all instruction or experience, and without deliberation, animals are directed to do spontaneously whatever is necessary for the preservation of the individual, or the continuation of the kind. Three main theories have been held with regard to instinctive actions: 1, That these various impulses and faculties were bestowed by the Creator upon each species as its necessary and characteristic outfit. 2, That instinct is the accumulated results of individual experience, fixed by repetition, and transmitted as an inheritance to succeeding races. In this view instinct is intelligent in its origin, an organized experience, a "lapsed intelligence." 3, That the greater number of complex instincts arise through the natural selection of variations of simpler instinctive actions —variations arising from unknown causes. The last theory is that of Darwin.

Institute of France, the principal philosophical and literary society of France, organized after the first storm of the French Revolution in 1795, to replace the Académie Française, the Académie des Sciences, and the Académie des Belles Lettres et Inscription, its object being the advancement of the arts and sciences. The Institute now embraces five distinct divisions or *académies*, each having a separate field of knowledge or thought. 1, The *Académie Française*, originally established early in the seventeenth century. Its department is the French language and literature, and its ordinary members number 40. 2, The *Académie des Inscriptions et Belles Lettres;* ordinary members, 40. 3, The *Académie des Sciences;* ordinary members, 65. 4, The *Académie des Beaux Arts;* ordinary members, 40. 5, The *Académie des Sciences, Morales, et Politiques;* ordinary members, 40. Each academy has an independent organization and a free disposition of the funds committed to it. Members are elected for life by ballot, and have an annual salary of 1,500 francs. To each academy are attached a certain number of honorary members and foreign associates. Admission into the Académie Française is a great object of ambition with most French literary men. The name of this distinguished body was changed in 1848 to *Institut National de France*, having previously been called *National*, *Imperial*, and *Royal* at different times.

Instrumental Music, music produced by *instruments*, as contradistinguished from *vocal* music. Instrumentation is quite a modern art, and may be said to have been first cultivated to any purpose among the Italians, who, up till the middle of last century, however, used only instruments of the viol kind, and who even yet are sparing in their use of wind instruments. In Italy, Leo, Durante, Jomelli, and Majo; in France, Rameau; in Germany, Haydn and Mozart, deserve the credit of carrying the art to a perfection up to their time undreamed of. Further developments of an important character are due to Berlioz and Wagner.

In′sulator, a body used to separate an electrified conductor from other bodies, and which offers very great resistance to the passage of electricity. Glass, shellac, resins, sulphur, ebonite, gutta-percha, silk, and baked wood are notable insulating materials. A glass cone is the usual form of insulators in telegraph

lines to support the wires on the posts. They are usually made of porcelain or glass.

Insurance, a system of business by which a company or corporation guarantees the insured to a specific extent and under stipulated conditions against pecuniary loss arising from such contingencies as loss or damage by fire (fire insurance), by shipwreck, accident or disaster of any kind at sea (marine insurance), by explosion, breakage, or other accidents to property, or the loss of future earnings either through disablement (accident insurance), or death (life insurance).

The first instance of insurance being recognized by law is found in the statutes of Wisby, Sanden, published about 1250, and the first English statute which recognizes it is in the reign of Elizabeth in 1601. Marine insurance is older than fire or any other species of insurance.

In fire insurance the underwriter promises in the policy he issues to indemnify the insured to a certain specified extent, and this promise carries with it the guaranty that the company he represents shall endure as long as the contract of insurance runs; the guaranty that the risks written shall be selected with due regard to quality, quantity, and exposure; the guaranty that the rate charged by the company shall be adequate, affording a profit upon its whole business that shall make security beyond doubt; and the further guaranty that what is earned by skillful underwriting shall be honestly guarded against wasteful extravagance, and against faulty and injudicious investments. Such is the scope of the underwriter's promise or guaranty, and such should be, and will be, the scope of his purpose if he keeps good faith; and it involves at all points and in every direction careful and conscientious management.

Bouvier thus defines, in legal phraseology, the term insurance: "In law, a contract by which one party, for an agreed consideration (which is proportioned to the risk involved), undertakes to compensate the other for loss on a specified thing, from specified causes. The party agreeing to make the compensation, is usually called the *insurer* or *underwriter*, the other the *insured* or *assured*, the agreed consideration the *premium*, the written contract a *policy*, the events insured against *risks* or *perils*, and the subject, right, or interest to be protected the *insurable interest*."

In fire insurance the insurer has to sign a formal application, and answer therein a series of questions; and the substantial truth of every answer would be taken as a condition precedent to any liability on the part of the insurers. It is customary to specify in the application, or policy itself, that certain risks are "hazardous" and a scale of premiums is some times given for different classes of property; and it is of extreme importance that the insured should not deceive the insurers on this point. But there must be a rational if not a liberal construction of all these rules. Thus, if cotton is represented as particularly "hazardous," a policy would not be rendered nugatory by the fact that a person insuring a stock of goods had one or two bales on sale. Should the party insuring desire to make any alteration in the premises insured, this intention should be made known to the parties granting the insurance; but mere alterations do not render a policy void in case they do not in reality increase the risk. It is customary to insert a provision in the policy (or in the rules of the company) for making necessary or proper repairs. It has been settled by the courts that although the loss resulting from a fire be traceable to the negligence of the servants of the insured, yet the insurers are still held; and this is likewise the case even if the fire be caused by the negligence of the insured himself, unless such negligence be so extreme and extraordinary as to raise a suspicion or implication of fraudulent intent. It will be seen by these facts that the courts generally are inclined to lean toward a liberal construction of insurance policies on behalf of the insured.

Valuation is in certain cases made in policies by stock companies upon chattels of uncertain value, as books, plate, or works of art. In such a case, if a loss happens, the insured is only entitled to actual indemnity; but a valuation is required by the charters of most companies, that they may not insure beyond a certain proportion of the value, and then the valuation is deemed binding on both parties. It is customary for insurers against fire to stipulate that they may rebuild or repair the premises insured, if they elect to do so instead of paying for the loss; and this alternative is frequently availed of by them. The law of warranties in fire insurance is of great importance. Warranties are promises of the insured that certain things exist or do not exist, or shall or shall not be done; and if the promise is broken the contract is void, whether the promise is material or not, or whether the breach of the promise is or is not the fault of the insured. These warranties must be complied with according to the usage and actual intention of the parties, as nearly as may be ascertained or reasonably inferred. The warranty need not be expressed in words, but may be implied by law. If it be an express policy, it must be written on or in the policy, or made a part of the same by distinct reference.

What constitutes a continuing warranty is a question which the courts have not infrequently had to do with. If expressly prospective, as that water-tanks shall be kept in an upper story, a breach of such condition renders the policy void, or suspends it for the time being. In like manner a statement in the description that the house is slated, would be a continuing warranty that it should remain slated. But a mention made in the policy that the insured building stands "500 feet from any other building" would not render the policy void should one of his neighbors erect a structure within 100 ft. of the building so insured.

It has of late been adopted as the settled policy of underwriters that heat alone, however excessive, or however caused, does not create liability on the part of insurers, un-

less there be fire or ignition, hence a loss by lightning is not held to be a loss by fire, unless the property be destroyed by ignition occasioned by the lightning. But in case of a fire, the later rulings of the courts lean strongly toward the insured in holding the insurers liable for the consequences of the conflagration. On this principle, loss of any kind occasioned by sincerely directed efforts to put out the fire, as by excessive water poured upon it, or any loss sustained by removal of the insured goods from a peril of fire, or by the blowing up or tearing down of a structure to stop the progress of a conflagration, would fall on the insurers. But the rule is that there must be an actual fire, within sufficient proximity and possessing sufficient danger to justify reasonable men in taking the measures resulting in the loss.

There is in fire insurance no rule such as "one third off new for old" as in marine insurance, nor any custom of making a partial loss total by abandonment, nor is there any such custom or rule as "general average" known among American fire underwriters.

Hazardous insurance is that which is effected at a high premium on buildings or goods having more than ordinary liability to catch fire. Such species of property embrace wooden structures of all descriptions, theaters, oil or varnish works, petroleum warehouses, fire-work manufactories or store rooms, powder magazines, etc. When the risk is considered to be very great, policies on such structures are denominated extra hazardous.

As regards marine insurance, it may be said that the principles governing its practise and the general rulings of the courts concerning it are practically the same with those relating to fire insurance, taking into consideration, of course, the nature of the property and the peculiar character of the risks. The same may be added in regard to accident insurance.

Life Insurance.—The incentive to life insurance is the desire to provide for a helpless family or relatives when the person insuring shall die. Dr. Richard Price may be considered the father of life insurance in this country. At first the rates of premium in this species of insurance were fixed in a purely arbitrary manner, but as observant men came to investigate the subject it was found that out of a given number of persons living it can be approximately foretold, from the results of the past, how many will die within a given time; and it was further discerned that the rate of mortality has a tendency to increase with the age of the lives observed. Careful investigations of these and cognate facts resulted in the embodiment in tabular form of the conclusions of close calculations and careful experience, constituting the basis of what are now known as mortality tables. These tables show how many out of a given number born complete each year of age. By means of such a table the insurers of lives are readily enabled to determine the rates of premium which should be charged.

The different kinds of policies issued by life insurance companies are: First, a whole-life policy, which is an agreement on the part of the company to pay to such representatives of the insured as may be mentioned in the policy a certain sum on the contingency of his death; second, a term policy, which is an agreement to pay to the representatives of the insured a certain sum at his death, provided that event happens within a fixed term; third, a simple endowment policy, which is an agreement to pay a certain sum to the insured at the end of a fixed term if he be then alive, the insurer himself taking the risk of living till the end of the term. Policies of the last named kind are not common in this country. Three fourths of all the policies issued in the U. S. are of the kind first named.

Insurance

The system of mutual life insurance has as its basis the equitable principle that payments shall be proportional to risks. Each member must pay toward the death claims which may occur within a stipulated time, such an amount as shall be determined by the company's risk of having to pay the claim arising from his own death within that period. Concerning the method of gauging this risk, considering the fact that the probability of dying prior to the expiration of a given period is greater, other things being equal, as the age is more advanced, the insurable part of life is divided into units of time of equal extent, and pending these unit periods the hazard is assumed to be the same, although differing in successive units, and increasing with greater rapidity as the age advances, in accordance with a specific rule. Customarily the unit of time assumed is a year.

The following is a synopsis of an insurance table, combining the experience of seventeen life insurance companies:

Age.	Living.	Dying.	Chances out of 1,000 of dying in one yr.	Natural Premium to Insure $1,000 for 1 year.
10	100,000	676	6.76	$ 6.50
20	93,268	680	7.29	7.01
30	86,292	727	8.42	8.10
40	78,653	815	10.36	9.96
50	69,517	1,108	15.94	15.33
60	55,973	1,698	30.34	29.17
70	35,837	2,327	64.93	62.44
80	13,290	1,866	140.41	135.01
90	1,319	427	323.73	311.28
99	1	1	1,000.00	961.54

The adoption in recent years of stringent regulations by the legislatures of the different states for the control of life insurance organizations has resulted in salutary benefits, materially strengthening the system, and eliminating many unsound institutions; so that life insurances may be said to be established to-day in this country on a thoroughly sound basis. Each state has an officer charged with the duty of examining into the affairs of all companies and if the assets are not sufficient to meet the liabilities in any given case, the company has to close its doors. This standard of solvency is a stricter one than that of Great

Britain. The distinguishing feature of American life insurance is the Tontine system which has enormously enhanced within a few years. This is the sharing of an annuity among a number of persons, on the principle that the share of each at his death is enjoyed by his survivors, until at last the whole goes to the last survivor or to the last two or three, according to the terms on which the money is advanced.

Interest is the allowance made for the loan or retention of a sum of money which is lent for, or becomes due at, a certain time; this allowance being generally estimated at so much per cent. per annum, that is, so much for the use of $100 for a year. The money lent or forborne is called the *principal;* the sum paid for its use, the *interest.* The interest of $100 for one year is called the *rate per cent.*, and the sum of any principal and its interest together, the *amount.* Interest is either *simple* or *compound. Simple interest* is that which is allowed upon the principal only, for the whole time of the loan or forbearance. *Compound interest* is that which arises from any sum or principal in a given time by increasing the principal, at fixed periods, by the interest then due, and hence obtaining interest upon both interest and principal. The rate of interest, supposing the security for the principal to be equal, depends obviously upon what may be made by the employment of money in various industrious undertakings, or on the rate of profit.

Interla'ken (between the lakes), a village in Switzerland, in the canton, and 26 mi. s.e. of Berne, beautifully situated near the left bank of the Aar, between the lakes of Thun and Brienz, much resorted to by tourists.

In'terlude, originally an entertainment exhibited on the stage between the acts of a play, or between the play and the afterpiece, to amuse the spectators while the actors rested or shifted their dress or the scenes, and decorations were changed. In England, dramas appear to have borne this name from the time they superseded the miracle and mystery plays till the period of the Elizabethan drama. The name is also given to a brief piece of church music, prepared or extempore, for the organ, and played after each stanza except the last of a metrical psalm or hymn.

Intermezzo (in-tĕr-met'so), in dramatic literature, nearly the same as interlude, a short musical piece, generally of a light sparkling character, played between the parts of a more important work, such as an opera, drama, etc. Pieces intended for independent performance are sometimes designated by this name by the French and Italians.

International Law, the law of nations; those rules or maxims which independent political societies or states observe, or ought to observe, in their conduct toward one another. International law is divisible into two heads, the one which regulates the rights, intercourse, and obligations of nations, as such, with each other; the other, which regulates the rights and obligations more immediately belonging to their respective subjects. Thus the rights and duties of ambassadors belong to that head which respects the nation in its sovereign capacity; and the rights of the subjects of one nation to property situated within the territory of another nation, belong to the latter head. Some of the maxims regarding the rights and duties of nations during a state of peace are: 1, Every nation is bound to abstain from all interference with the domains of other nations. 2, All nations have equal and common rights on the high seas, and they are not bound to admit any superiority there. The sea which washes the coast of a nation, to the extent of three miles, is now deemed to be a part of the territory of the nation, over which it may exercise an exclusive jurisdiction. And, in respect to persons subjected to its laws, every nation now claims a right to exercise jurisdiction on the high seas, for the purpose of enforcing both international law and its own municipal regulations. 3, No nation has a right to pursue any criminal or fugitive from justice in a foreign country; its claim, if any, is a mere right to demand him from the nation in which he has taken refuge. 4, Every nation has a right to regulate its own intercourse and commerce with other nations. 5, Foreigners are bound to obey the laws of a country as long as they reside within it, and under its protection; and the property held by foreigners within a country ought to be protected in the same manner as that of natives. 6, Every nation has a right to send and to receive ambassadors and other public ministers; and this right of embassy has always been deemed peculiarly sacred. Their persons are held sacred and inviolable. Their property, and servants, and retinue enjoy a like privilege. 7, It is through the medium of ambassadors and other public ministers that treaties, conventions, and other compacts between nations are usually negotiated, thus forming a positive code for the regulation of their mutual rights, duties, and interests. In the modern practise of nations such treaties and compacts are not generally deemed final and conclusive until they have been ratified by the respective governments to which the negotiators belong.

War introduces an entirely new order of rules. The right of declaring war results from the right of a nation to preserve its own existence, its own liberties, and its own essential interests. In a state of nature men have a right to employ force in self-defense; and when they enter into society this right is transferred to the government, and is an incident to sovereignty. What are just causes for entering into a war is a question which has been much discussed by publicists. Defensive wars are necessarily justifiable from the fact that they involve the existence or safety of the nation and its interests. But offensive wars are of a very different character, and can be justified only in cases of aggravated wrongs or vital injuries. The first effect of a declaration of war is to put all the subjects of each of the nations in a state of hostility to each other. All the property belonging to each is deemed hostile. If it be personal property it may be captured as prize; if lands, it may be seized and confis-

cated at the pleasure of the sovereign; if it be merely in debts or stock it may, in the extreme exercise of the laws of war, be equally liable to confiscation. As soon as a battle is over the conquerors are bound to treat the wounded with kindness, and the prisoners with a decent humanity. And there are some things which seem positively prohibited from their cruelty and brutal barbarity; such are the violation of female captives, the torturing of prisoners, the poisoning of wells, the use of inhuman instruments of war. In time of war there is occasionally an intercourse between the belligerents which should always be held sacred. Thus the interchange of prisoners by cartels; the temporary suspension of hostilities by truces; the passage of flags of truce; the engaging in treaties of capitulation. When any conquest of territory is made the inhabitants pass under the dominion of the conqueror, and are subject to such laws as he chooses to impose upon them. There are also certain rights which war confers on the belligerents in respect to neutrals. Thus they have a right to blockade the ports or besiege the cities of their enemies, and to interdict all trade by neutrals with them. But no blockade is to be recognized unless "the besieging force can apply its power to every point in the blockaded state." They have a right also to insist that neutrals shall conduct themselves with good faith, and abstain from all interference in the contest by supplying their enemy with things contraband of war. And hence arises the incidental right of search of ships on the high seas for the detection of contraband goods. A neutral nation is bound to observe entire impartiality between the belligerents. Neutral nations are, strictly speaking, bound to compel their subjects to abstain from every interference in the war, as by carrying contraband goods, serving in the hostile army, furnishing supplies, etc. Subject to the exceptions above referred to, a neutral has a right to insist upon carrying on its ordinary commerce with each of the belligerents in the same manner as in times of peace.

Intes'tacy, in law, the condition of a person who dies without having left any will at all, or having left one not legally valid, or such a will that nobody becomes heir under it. The general principle in the U. S. is that the law provides an heir or next of kin if the owner himself has not done so. In the case of a person dying partially intestate, the property not included in the settlement goes to the heir-at-law or next of kin according as it is real or personal estate.

Intestine (Lat. *intestinum*, from *intus*, within), the name given to the convoluted membranous tube which extends from the right or pyloric orifice of the stomach to the anus, and which receives the ingested food from the stomach, retains it for a longer or shorter period, mixes it with the bile, pancreatic juice, and intestinal secretions, gives origin to the lacteal or absorbent vessels which take up the chyle and convey it into the current of the blood, and which, lastly, conveys the fæcal or indigestible products from the system. See *Anatomy*.

Intoxication, the state produced by the excessive use of alcoholic liquids. In the first stage the circulation of the blood becomes somewhat more rapid, and all the functions of the body and the mind are exercised with more freedom. In the second stage the effect on the brain is more decided. The peculiarities of character, the faults of temperament, manifest themselves without reserve; the secret thoughts are disclosed, and the sense of propriety is lost. In the next degree consciousness is still more weakened; the ideas lose their connection; vertigo, double vision, and other discomforts supervene; until finally the excitement partakes of the nature of delirium, and is followed by a more or less prolonged stupor, often by dangerous coma. In cases of extreme intoxication the stomach-pump should be employed, if ordinary emetics fail to overcome the torpor of the stomach.

Invalides (an-vå-lēd), Hôtel des, a splendid hospital for disabled soldiers at Paris, in the suburb of St. Germain, erected by Louis XIV between 1670 and 1673. A soldier must have served ten years to be received into this hospital on account of poverty or infirmity. In vaults under the dome lie the remains of Turenne and several other great French commanders, including those of Napoleon I, deposited here Dec. 15, 1840.

Inverness', a town in Scotland, capital of the county of same name, and chief town in the Highlands. The industries include shipbuilding, rope making, tanning, distilling, brewing, etc., and there is a considerable trade, there being regular communication by sea and canal with Glasgow, Liverpool, Aberdeen, Leith, etc. Pop. 19,214. The county, which is the largest in Scotland, includes an area of 4,255 sq. mi. Great part of the surface is barren heath, useless except for sporting purposes, but a considerable portion is suited for rearing cattle and sheep. Near the southwestern extremity of the Caledonian Canal is Ben Nevis, 4,406 ft. high, the loftiest mountain in Great Britain.

Invertebra'ta, a collective term for the five great lower divisions or sub-kingdoms of the animal series, which agree in not having a vertebral column or backbone, used in contradistinction to the highest group of the animal kingdom, to which the name *Vertebrata* or *Vertebrate* animals is given, all of which possess a vertebral column. In the system of Cuvier the Invertebrata were divided into the *Radiata*, *Articulata*, and *Mollusca*. Succeeding naturalists split up Cuvier's *Radiata* into the sub-kingdoms *Protozoa*, *Cœlenterata*, and *Echenozoa* or *Annuloida*, which with the *Annulosa* and *Mollusca* now form the recognized divisions of the Invertebrate. In Invertebrates no structure analogous to the vertebrate spine is found. Where hard parts exist in them they are generally placed on the outside of the body and thus constitute an *exo-skeleton* or outer *skeleton*—as opposed to the *endo-skeleton*, or internal skeleton of the Vertebrata. The shell of

the crab or lobster is a familiar example. The limbs of Vertebrates are never more than four in number, while those of the Invertebrata may be very numerous. Among Vertebrates also reproduction is purely and solely *sexual;* but in Invertebrata *asexual* reproduction is common, many of them reproducing their species by *gemmation* or *budding*, and by *fission.*

Invest'iture, in the feudal law, was the open delivery of a fee or fief by a lord to his vassal, thus, by external proof, affording evidence of possession; or the formal introduction of a person into some office or dignity. Investiture was often performed by the presentation of some symbol to the person invested, as a branch of a tree, etc. The investiture of persons with ecclesiastical offices or dignities is historically the most important phase of the subject. The estates and honors which composed the ecclesiastical temporalities were considered to partake of the nature of fiefs, and therefore to require similar investiture from the lord. Charlemagne is said to have introduced this practise, and to have invested the newly-consecrated bishop by placing a ring and crosier in his hands. The custom does not appear to have been opposed during the lapse of two centuries from his reign, but the church at last protested strongly against it.

In'voice, account in writing of the particulars of merchandise transmitted to the purchaser, giving price and quantity, note of charges, and any other needful details. By sending an invoice along with goods a merchant gives official advice to his correspondent of the understood terms of a contract. If the goods are received and the invoice retained this will be held valid evidence in law of the contract.

Io, in Greek mythology, the daughter of Inachus, beloved by Zeus, who to protect her from the jealousy of Hera (Juno), changed her into a beautiful white heifer.

I'odine (Gr. *ion*, a violet), a peculiar non-metallic elementary solid substance, symbol I; atomic weight 127. It exists in the water of the ocean and mineral springs, in marine molluscous animals, and in sea-weeds, from the ashes of which it is chiefly procured. It exists also in certain land plants and in cod-liver oil. It is found in certain minerals, the water of certain rivers, and the rain water of several towns. At the ordinary temperature of the atmosphere it is a solid crystalline body. Its vapor is of an exceedingly rich violet color, a character to which it owes its name. Iodine has a very acrid taste, and its odor resembles that of chlorine. It is an irritant poison, but in small doses has been of great service in certain forms of glandular disease. It is largely used in photography, in the preparation of aniline colors, and in other ways. It is chiefly made at Glasgow. The great consumption of iodine is in medicine; it is employed in its pure state, but much more frequently in the form of iodide of potassium, which has been found of great benefit in goiter, scrofula, disease of the liver and spleen, in syphilitic affections, rheumatism, etc., as well as in lead-poisoning. Iodide of iron is another useful medicine, being employed in chlorosis, anæmia, scrofula, and glandular affections.

Iod'oform, a substance analogous to chloroform in composition, but in which iodine replaces chlorine. It is in the form of small, solid yellow crystals, and is prepared by the action of alcohol and other bodies on iodine and potash. It is nearly insoluble in water, but dissolves in ether, oils, and alcohol. It is used in medicine as an antiseptic, and acts slightly as an anodyne; it is successfully applied to ulcers and sores of various kinds, and is used as a snuff for cold in the head. It may be prepared as an ointment.

Ionia, that part of the seaboard of Asia Minor which was inhabited by Ionian Greeks, a beautiful and fertile country opposite the islands of Samos and Chios, which also belonged to it. According to tradition the Greek colonists came over from Attica about the middle of the eleventh century B.C., and founded twelve towns, which, though mutually independent, formed a confederacy for common purposes. Commerce, navigation, and agriculture early rendered them wealthy and flourishing, but the country was made tributary by Crœsus, king of Lydia, and later by Cyrus, king of Persia (557 B.C.). With an interval of independence they remained under Persia until this empire was overthrown by Alexander the Great (334–331 B.C.), when they became a part of the Macedonian Empire. Ionia, at a later period, became part of the Roman province of Asia. It was afterward totally devastated by the Saracens, so that few vestiges of its ancient civilization remain.

Ionian Islands, a number of Greek islands in the Ionian Sea, extending along the western and southern shores of Greece, of which the largest are Corfu, Cephalonia, Zante, and Cerigo, others being Ithaca or Thiaki, Paxos, and Santa Maura; area 1,097 sq. mi. The staple exports are oil, currants, valonia, wine, soap, and salt. The few manufactures are chiefly textile and ornamental. Pop. 244,433.

Ionians. See *Greece* (*History*) and *Ionia.*

Ionian Sea, the ancient name of that part of the Mediterranean which lies between the south part of Italy and Greece.

Ionic Order, one of the orders of classic architecture, the distinguishing characteristic of which is the volutes of its capital. In the *Grecian Ionic*, 1, the stylobate consists of three receding equal steps the combined height of which is from four fifths to a whole diameter; 2, the column, which includes band, shaft, and capital, is rather more than nine diameters in height, the shaft being fluted with twenty-four flutes and alternating fillets; while, 3, the entablature is rather more than two diameters in height. The volutes are connected on the flanks by a peculiar roll molding, called the *baluster* or *bolster.* In the *Roman Ionic*, a modification of the latter style, the stylobate is lofty and not graduated; the shaft diminishes one tenth of a diameter and has twenty fillets and flutes; the capital, which is two fifths of a diameter, has its volutes a little lower than

the other, and a square abacus with molded edges covers the whole. The chief examples of the Grecian Ionic are those of the Athenian Acropolis; while those of the Roman Ionic are found in the temple of Fortuna Virilis and the Coliseum at Rome.

Ionic School, the earliest school of Greek philosophy, a school which attempted to explain the phenomena of nature from the forces and attributes of matter itself. It taught the doctrine of the immediate unity of matter and life, according to which matter is by nature endowed with life, and life is inseparably connected with matter. The originator of this school, and indirectly of Greek philosophy in general, was Thales, who flourished about 600 B. C. The other chief philosophers of the school were Anaximander, Anaximenes, Heraclitus, and Anaxagoras.

I O U, a memorandum of debt given by a borrower to a lender, so called from being made in this abbreviated form:

Chicago, Oct. 1, 1901.
I O U Twenty Dollars.
To Mr. C. D. D. E.

An I O U is a convenient document as an evidence of debt in case action is afterwards brought for recovery. If the I O U contains any promise to pay it is recognized at law as a promissory note, and then becomes subject to the same treatment as that class of paper. It should be in the handwriting of the signer, and be addressed to some person or persons. During the existence of the recent revenue law the I O U was in frequent use.

Iowa (i'o-wa) the *Hawkeye State*, one of the central group of states; is bounded on the n. by Minnesota, on the e. by Wisconsin and Illinois, on the s. by Missouri, and on the w. by Nebraska and South Dakota. The average breadth of Iowa from n. to s. is 200 m., the average length from e. to w. about 300 m.; gross area, 56,025 sq. m. Pop. in 1900, 2,231,853.

Surface —The surface is a rolling prairie, broken only by the hills and bluffs bordering the principal streams. The average elevation is 1,100 ft. The highest point in the state, about 1,700 ft., is in the n. w. near Spirit Lake, Dickinson co. The lowest point, about 500 ft., is in the extreme s. w. near the confluence of the Des Moines with the Mississippi. The bluffs range in height from 200 to 400 ft. The Mississippi and the Missouri are the only navigable rivers. The Mississippi flows along the entire eastern border of the state; the Missouri forms the western boundary from Sioux City southward. The chief branches of the Mississippi are the Wapsipinicon, Iowa, Skunk and Des Moines rivers; of the Missouri, the Big Sioux, the Little Sioux, Boyer, Nishabotna and Nodaway rivers. The Des Moines is the largest river. A number of lakes are found in the northern part of the state. Among these, Spirit Lake and the Okoboji's are the largest. Clear Lake, Storm Lake and Wall Lake are also popular summer resorts.

Climate.—The climate is very nearly homogenous, owing to the nearly uniform elevation, the lack of extensive forests and the inland location. In summer, excessive heat is usual, the thermometer ranging from 66° to 100°. The summer nights are sultry and enervating. In winter, it is correspondingly cold, ranging from 14° to 30° below zero in the coldest months. The average annual temperature is 47°. The rainfall is abundant, especially during May, July, August and September; the annual average is 40 in.

Mining.—Iowa holds first place among the coal-producing states west of the Mississippi river and seventh in the Union. The beds of bituminous coal, lying principally in the southern part of the state, cover an area of 20,000 sq. m. In 1899, the mines produced 5,177,479 short tons, valued at $6,397,338, and gave employment to more than 11,000 men. Three or four veins are often worked in the same mine, and between the layers of coal an excellent quality of clay is found. Clay, suitable for brick and tile-making, potter's clay and paving brick clay are abundant. In 1899, the state produced sandstone to the value of $24,348, and limestone valued at $785,546. Iowa ranks third in the U. S. in the production of gypsum, which is found in large quantities at Fort Dodge. Lead has been mined near Dubuque for more than 100 years and very valuable deposits have recently been discovered there.

Agriculture.—Iowa is pre-eminently an agricultural state. About 95 per cent. of the surface is tillable land. The soft black loam of the prairies is from one to three feet deep. In 1900, it had a farm area of 34,574,337 acres. Its generally level surface, free from stumps and stones, is well adapted to the use of farm machinery. In 1900, Iowa reported the highest value of farming implements and machinery used, $57,960,660. It ranked second in the U. S. in cereal production, yielding 593,978,358 bushels. In the production of oats the state ranks first, in corn second, in barley fourth. Stock-raising is one of the leading occupations; in the value of domestic animals, Iowa holds first place. Much attention is given to the raising of draft and driving horses, thousands of which are exported annually. Sheep, hogs and cattle are raised in great numbers. As a dairy state, Iowa ranks second to New York only. In the vicinity of all the important towns and cities, many people devote their attention to raising vegetables and small fruits. Southern Iowa has become famous for the large quantities of apples, grapes and cherries produced.

Manufactures.—Although agriculture is the leading pursuit of Iowa, manufacturing interests have grown steadily during the last half century. The leading industries in the state in the order of their importance are: slaughtering and meat-packing; factory manufacture of butter, cheese and condensed milk; flour and grist milling; manufacture of lumber and timber and of planing mill products. An industry of recent origin, peculiar to Iowa, is the manufacture of pearl buttons from the shells of the native fresh-water mussel. The leading center of the industry is Muscatine,

but almost every town on the Mississippi river from Sabula to Ft. Madison manufactures the "Mississippi river" buttons. Extensive car construction and repair shops are located at Burlington, Davenport and several other cities. The total value of manufactures for 1900 was $164,617,877. The leading manufacturing centre is Sioux City.

Transportation.—The location of the state is such that it is a highway for the transfer of commodities between the east and the west, while extensive transportation facilities are necessary to place its own enormous production on the market. It had in 1901, a total mileage of 9,336.65, with several branch lines in process of construction, thus ranking fourth in the U. S. in mileage. Six trunk lines cross the state from east to west, and these with their branches cover it so completely that no spot within its borders is farther than twelve miles from a railway station. The principal roads are the C. B. & Q., B. C. R. & N., Chicago & Gt. Western, C. M. & St. P., C. & N. W., C. R. I. & P., C. St. P. Minn. & O., Great Northern, Illinois Central and Iowa Central. The Mississippi river brings many imported articles, as tea, coffee and spices, into the state, and carries some of the exports southward.

Education.—Iowa is very liberal in the support of her educational institutions. The permanent school fund, derived principally from the sale of public lands, amounts to over $4,700,000. The state institutions for higher education are the state university at Iowa City, the agricultural college at Ames and a state normal school at Cedar Falls. Among denominational colleges are Iowa College at Grinnell, Cornell College at Mt. Vernon, and Drake University at Des Moines. The state maintains numerous charitable institutions and two state penitentiaries.

History.—Iowa was discovered by the French in 1673. In 1803, the United States bought of France a vast territory, known as the Louisiana Purchase, in which Iowa was included. From 1804 to 1838, Iowa was a part of Indiana, Missouri, Michigan and Wisconsin territories successively. The first settlement was made at Dubuque in 1788, by Julien Dubuque and ten associates, who came to dig lead ore. But no permanent settlement was made until 1833, after the close of the Black Hawk War, when pioneers came in steadily from New England and the states directly east. Iowa was organized as a separate territory in 1838 and became a state in 1846. Since then its growth has been steady in population and in wealth. It now ranks among the foremost states of the Union in the value of its productions and in importance. About five-sixths of the entire population are natives of the U. S. At Amana, in Iowa county, is an interesting communistic organization of Germans, known as the Amana Society. The society owns six townships of well-improved land and holds all property in common. There is an Indian reservation in Tama county where about 400 Indians reside. The principal cities with their population in 1900, are: Des Moines, the capital, 62,139; Dubuque, 36,297; Davenport, 35,254; Sioux City, 33,111; Council Bluffs, 25,802; Cedar Rapids, 25,656; Burlington, 23,201; and Clinton, 22,698.

Iowa, State University of, an institution of higher learning founded at Iowa City, Iowa, in 1855 and reorganized in 1860. The university comprises a college of liberal arts, a graduate school, departments of law, medicine, homeopathic medicine, dentistry and pharmacy, the Iowa School of Political and Social Science, a summer session for teachers and a summer school for library training. In 1904 the faculty numbered 163, the student body 1442, and the library contained 68,000 volumes.

Iowa City, Johnson co., Ia., on Iowa River, 54 mi. w. by n. of Davenport. Railroads: C. R. I. & P., and B. C. R. & N. Industries: flouring mills, iron goods, linseed oil, etc. It is the seat of the state university and other educational institutions. Pop. 1900, 7,987.

Ipecacuan'ha, a substance used in medicine, of a nauseous odor and repulsive, bitterish taste, the dried root of several plants growing in South America. The best is the annulated, yielded by the *Cephaelis Ipecacuauha*, a small shrubby plant, a native of Brazil, Colombia, and other parts of South America. The name of *American Ipecacuanha* is given to the *Euphorbia Ipecacuanha*, a plant which grows in sandy places in North America.

Iphigenia (if-i-je-nī'a), in Greek legend and poetry, daughter of Agamemnon and Clytemnestra. To avert the wrath of Artĕmis, whom Agamemnon had enraged by killing a consecrated hind, and who detained the Greek fleet at Aulis that had been prepared for the Trojan war, Iphigenia was to be sacrificed on the altar; but a hart was miraculously substituted for her, and she was conveyed in a cloud to Tauris. She became priestess here to Artĕmis, and saved her brother Orestes when on the point of being sacrificed.

Ipsam'bul (Abusum'bul, or Abusim'bel), a village of Nubia, on the left bank of the Nile; remarkable for containing two of the most perfect and magnificent specimens of Egyptian rock-cut temples existing. The façade of one of them is adorned with several stupendous colossal sitting statues of Rameses II (the Great), the largest pieces of Egyptian sculpture yet discovered.

Iran (or Eran) (Old Persian, *Aryana;* Zend, *Airyana*, that is, land of the Aryans), the name given by the ancient Persians to their native land, and still used by the modern Persians, though it is also employed in a wider sense to designate the whole of the country from the Indus to the Tigris.

Iranian Languages, a family of languages belonging to the Indo-European stock, closely allied to the Indian group, and called by some philologists Persian from the best-known member of the family. The two oldest known Iranian languages are the Old Persian of the cuneiform inscriptions and the Old Bactrian or Zend, the latter the language in which the Zend-avesta or sacred writings of the Parsees is composed. The Middle Iranian languages

are the Pehlevi, and still later the Parsee, which are preserved in the commentaries to the Zend-avesta. The latter approaches pretty closely to the modern Persian. The most important of the New Iranian languages is the modern Persian, in which has been produced a very rich and celebrated literature. The Afghan or Pushtu, and the dialects of the Kurds, form separate branches of the Iranian family.

Ireland (in Irish, *Erin;* in Latin, *Hibernia*), the more western and smaller of the two principal islands of which the United Kingdom is composed, is separated from Great Britain on the east by the Irish Sea, and surrounded on all other sides by the North Atlantic Ocean. Measured diagonally, the greatest length, from Mizen Head in the s. w., to Fair Head in the n. e., is 300 mi.; and the greatest breadth, from Carnsore Point in the s. e., to Benwee Head in the n. w., is 212 mi.; the central breadth, nearly between the bays of Dublin and Galway, is 110 mi. The area is 32,531 sq. mi. Ireland is divided into the four provinces of Leinster, Ulster, Munster, and Connaught, and into 32 counties. Pop. in 1901, 4,456,546. The capital is Dublin; the other chief towns are Belfast, Cork, Limerick, and Londonderry.

Surface.—The coast, forming a line of nearly 3,000 mi., is, in general, bold and rugged, and is diversified by numerous indentations, some of which run far into the land and form excellent natural harbors. There are a considerable number of islands, chiefly on the w. coast, the largest being Achill. The mountains, generally speaking, rise in isolated masses at a short distance from the coast, the interior having the form of a vast plain, in which are extensive tracts of bog. The Macgillicuddy's Reeks, in the s. w., are the highest, the culminating summit being Carrantual, 3,414 ft. The mountains of Wicklow, in the s.e., reach the height of over 3,000 ft. (Lugnaquilla is 3,039). Rivers are not only numerous, but are very equally distributed over the surface. The Shannon, in the w., the largest river of Ireland, if not of the United Kingdom, is navigable to its source in Lough Allen, forming a waterway of 240 mi. The other rivers of most importance are the Bandon, Lee, Blackwater, Suir, and Barrow, which enter the sea on the s., the last two by the union of their streams forming the broad estuary of Waterford harbor.

Geology and Minerals.—The mountains are formed of vast masses of primary and metamorphic rocks, while the secondary formations spread over the interior. In some cases, particularly in the southwest, the coal measures occupy considerable areas, but the quality of the coal is generally very inferior, and it is worked only to a very small extent, the yearly output being only about 100,000 tons. The strata higher in the geological series than the coal are very partially developed. Of other minerals than coal Ireland yields small quantities of iron ore, lead ore, slate, alum, salt, etc.

Climate.—The climate is on the whole more moist, milder, and more equable than that of the greater part of Britain. It is highly favorable to vegetation, and allows plants to winter in the open air that can do so in very few places in Britain; some species of plants also being peculiar in Ireland alone of the British isles, as for instance the strawberry tree or arbutus, found in the southwest.

Agriculture.—As regards agriculture, Ireland has great advantages; for though there is a great extent of moorland, there is also a vast area of arable surface, covered with a deep, friable loam of remarkable richness. Notwithstanding, agriculture on the whole is in a backward state, a result largely due to the smallness of the holdings, and to the evils of overcropping. However, a steady diminution is now taking place in the number of very small holdings. The rearing of live stock and dairy farming are largely carried on. By far the largest grain crop is oats; the chief green crop is potatoes, which cover an area about one and a half times as large as in Great Britain. Potatoes had become the main food of the people by the end of the seventeenth century, and a potato famine occurred as early as 1739. Another staple crop, especially in the north, is flax.

Industries and Trade.—Of industrial employments the linen manufacture is the chief and is in a very flourishing condition. It has increased in a remarkable manner within the last twenty or thirty years, and Belfast, its center, has now become the second city of Ireland. The woolen manufacture at the outset outstripped that of linen; but it was hampered by unjust restrictions imposed by Parliament at the instance of the woolen manufacturers of England. The brewing of porter and distillation of whisky form important industries. The fisheries employ a considerable number of persons. The salmon fisheries are valuable, and are increasing in value. The trade is only of a moderate bulk. The main articles of export consist of agricultural produce, the greater part of which finds its market in Great Britain. These articles include grain, live stock, salt and fresh meat, eggs, butter, etc. Of manufactured articles linen is the chief export; whisky and porter are also exported. The trade with foreign countries is inconsiderable. The railroad system has attained a total length of 2,650 mi.

Religion.—The prevailing religion is the Roman Catholic. The Reformation never made much progress, and though the Protestant Episcopal Church was established by law it was only the church of a small minority. In 1869 an act was passed for its disestablishment. Its affairs are now managed by diocesan synods and the general synod in conjunction with a representative body. The supreme legislative powers reside in the general synod, which meets in Dublin, and is composed of the archbishops of Armagh and Dublin and the ten bishops, and of lay and clerical representatives from the different dioceses; the lay representatives being more than twice as numerous as the clerical. The representative body consists of the archbishops and bishops *ex officio*, thirty-six lay and clerical elected

members (three for each diocese), and twelve co-opted members elected by the other two classes conjointly. At the head of the Roman Catholic Church are four archbishops, who take the title of Armagh, Dublin, Cashel, and Tuam, and twenty-four bishops. The whole of the Irish Roman Catholic clergy are supported solely by voluntary contributions. The number of priests is 3,200, more than half being curates. There are numerous monasteries and convents. The Presbyterian Church is chiefly confined to Ulster, where it may be said, especially in the counties of Down and Antrim, to be the leading religious denomination. Its ministers are supported by voluntary contributions, seat rents, and church funds.

Education.—The principal educational institutions are Dublin University and the three Queen's Colleges of Belfast, Cork, and Galway. The Queen's Colleges were formerly connected with an examining and degree-conferring body (Queen's University); but for this a similar body, the Royal University of Ireland, was substituted in 1882, $100,000 being yearly granted from the surplus funds of the Irish church. The Royal College of Science, established in 1867, supplies a complete course of instruction in science applicable to the industrial arts. The Catholic University of Ireland, established in 1854, consists of University College, Dublin; St. Patrick's College, Maynooth; and several other colleges. The chief elementary schools are those under the superintendence of the Commissioners of National Education.

Government.—Ireland, by the act of union, became in 1801 an integral part of the United Kingdom, and shares in its legislation by means of twenty-eight representative peers in the House of Lords, and 103 representatives in the House of Commons. The representative peers are elected for life by the whole body of Irish peers. The lord lieutenant, who represents the sovereign, is the head of the executive, and holds his court in Dublin Castle. He is assisted by a privy council and a chief secretary, who takes the most active part in the administration of affairs. As in England the chief legal functionaries are a lord chancellor, a lord chief justice, and a master of the rolls. The Irish police force is a semi-military body, paid out of the Consolidated Fund.

History.—Little is known with certainty concerning the earliest history of Ireland. From the native legends of the people we know that the island was for many centuries inhabited by various Celtic tribes. But the authentic record of the people begins with the Scoti, who having subdued all the other tribes inhabiting the country, descended upon Britain, then a Roman province. From Britain they extended their expeditions into Gaul, and became known as a proud and warlike race. From the earliest period each province appears to have had its own king, subject to a great monarch, the *ardri*, to whom the central province was allotted. Each clan was governed by a chief, selected from its most important family. Their religion was a nature-worship and their priests, or Druids, and poets, or Bards, occupied a position almost equaling that of the king in honor. Professional priests, or Brehons, dispensed the laws and were endowed with lands and held in high esteem.

Christianity found its way into Ireland at an early date, and by the middle of the fourth century had made considerable progress. The prompt acceptance of Christianity by the Irish in contradistinction to other pagan peoples is strong reason for regarding them as superior intellectually and especially amenable to logical conviction. It is said that beyond any other heathen nation, conversion to Christianity in Ireland was bloodlessly effected. In 432 the young British priest Sucat, afterward known as St. Patrick, began his great mission in Ireland. Other missionaries continued the work, and in the sixth century many churches and monasteries were founded. Religion and learning flourished in the monasteries, which soon began to send out zealous Irish missionaries to establish churches in Britain and on the continent.

In 795 the Norsemen began to make incursions upon the Irish coasts and by the ninth century had pushed far into the interior and founded a kingdom. In 1014 they were conquered by King Brian. In 1166 O'Connor, King of Connaught, took the title of King of Ireland. In 1168 he drove Dermot MacMurrough, King of Leinster, out of his kingdom. Dermot fled to England and seeking refuge at the court of Henry II obtained permission to enlist the services of English subjects for the recovery of his realm. Returning with a force of men led by Richard de Clare, called Strongbow, Dermot was for a time successful and regained his seat on the throne. Upon his death "Strongbow" claimed the throne, but was opposed by O'Connor, who defeated him in a number of battles, but finally entered into a convention, according to the terms of which he was allowed to keep his seat and his English subjects were permitted to establish themselves on lands in the eastern part of the island. When Henry II visited Ireland in 1175 O'Connor paid him homage and recognized him as Lord of Ireland.

During the thirteenth century the Anglo-Normans succeeded in thoroughly establishing themselves in Ireland with the feudal institutions of their nation. In 1314 Edward Bruce invaded the country and attempted to overthrow the English power, but was unsuccessful. Gradually, the new settlers became identified with the natives, adopting their language, habits and laws. The power and influence of the Irish increased until, at the time of the War of the Roses, the authority of the English Crown was limited to a few towns on the coast and a small district about Dublin. In the struggle between the houses of York and Lancaster, Ireland supported York. Under Henry VII a law was enacted making the Irish Parliament dependent upon the King. The power of the English now became stronger.

Soon after Henry VIII had declared himself

the Head of the Anglican Church, he began his crusade against the Catholics in Ireland. He caused the monasteries to be destroyed and their wealth confiscated and ordered the persecution of all persons who refused to recognize him as the Head of the Church. Henry's policy now was to conciliate the Irish by offering them a share of the spoils and leaving them under their own laws. An English commission held courts all over the island, but Irish rights were usually respected in everything except religion.

In the Parliament of 1541 Henry first assumed the title of King of Ireland. Edward VI continued the policy of his father, but Mary, his successor, who was a devout Catholic, did what she could during her short reign to restore the old faith and re-established many of the ruined monasteries and abbeys. At first Elizabeth followed her father's policy of conciliating the chieftains, but after the rebellion of Shayne O'Neill changed her attitude. Irish rights were now not only not respected, but were ignored altogether. The people finally rose in rebellion and a long war ensued, in which the Irish fought desperately for their freedom, but finally were forced to yield. The country was laid desolate and many more perished from hunger than by the sword. James I was somewhat more favorable to Ireland than Elizabeth, but arbitrarily demanded of every Irish landholder the document upon which he rested his claim to his property and if it contained any formal error, or could not be produced, his lands were forfeited to the Crown. This injustice, together with the fact that Catholics were excluded from all public appointments, led to another attempt in 1641, during the reign of Charles I, to shake off the English yoke. Charles succeeded in restoring order and a degree of prosperity returned to the island. After the death of Charles in 1649 Cromwell was appointed lieutenant of Ireland and energetically, but cruelly, reduced the country in nine months. Under James II Catholics were advanced to positions of State and Irish forces loyally helped James in his attempt to regain his crown. By the terms of the Treaty of Limerick, Catholics were promised a certain amount of religious freedom and restoration of their lands, of which they had been dispossessed. The terms of this treaty were soon violated and severe penal laws, affecting the Catholics particularly, were enacted. This oppression continued during the next century, but in 1782, while the American War of Independence was going on, the Irish patriots, taking advantage of the embarrassment of the English government, demanded and achieved legislative independence. This independence was, however, maintained only a short time. In 1798, while England was engaged in war with the revolutionists of France, the Irish again revolted with the intention of setting up a republic. The uprising was quelled, the Irish Parliament abolished and Ireland given representation in the English Parliament. The Irish patriots bitterly opposed this extinction of the legislative independence of Ireland and from that day until the present there has been more or less agitation for its repeal and the establishment of the old Irish Parliament. In 1841 under the eloquent Daniel O'Connell, Ireland was brought to the verge of insurrection, but the movement was suppressed. For many years other troubles had racked Ireland, occasioned by the oppressive land laws which had been enacted from time to time. The suffering caused by these laws came to a climax in 1845 and 1846 when a great potato famine occurred. Thousands died of starvation and hundreds of thousands emigrated to America. Subsequently, certain reforms in the land laws were carried out and agricultural and manufacturing interests revived. But the struggle for liberty continued and took form in an agitation for what is known as Home Rule (which see). In 1886 Mr. Gladstone, then prime minister, proclaimed the right of Ireland to Home Rule by introducing into Parliament a bill to grant separate legislation. In 1898 an important act was passed establishing Irish county councils, rural district schools and boards of guardians, and transferring to them the administrative functions formerly discharged by the grand juries and presentment sessions. Encouraged by this, the people of Ireland began to proclaim more boldly their discontent with the existing land laws and their desire for Home Rule. In 1903 the land question was practically disposed of by the enactment of the Land Purchase Bill providing whereby the tenants, subtenants or the people may purchase the land and hold it as their own. The land question being thus almost wholly removed from the arena of Anglo-Irish discussion, Home Rule is now the only important issue dividing the peoples of England and Ireland. And, since with the disposal of the land question, the principal obstacle in the way of some form of Irish home rule is removed, it is probable that ere long that subject will be taken up on its own merits by the leaders of all parties in England.

Language and Literature.—The Irish language belongs to the Gælic or Gædhelic branch of the Celtic stem of languages, being closely akin to the Gælic of Scotland and the Manx, and more remotely allied to the British dialects (Welsh, Cornish, and Armoric). The modern dialects are varieties of Irish, which differ very much from the ancient, are spoken by the rural classes in Connaught and Munster, and the more remote parts of Ulster and Leinster. In 1891 there were only 38,192 persons in Ireland who spoke Irish only, and 680,245 who could speak it along with English. In very recent years an attempt has been made to popularize the Irish language again. During the last decade of the nineteenth century though the number who were able to speak the Irish language decreased for the country as a whole, the number almost doubled in Leinster and increased also in Ulster.

Irish literature is rather varied and extensive, including history, legendary and actual,

in prose and verse, annals, genealogies, and pedigrees, mythological and imaginative tales, lyric poetry, satire, lives of saints, treatises on law, science, grammar, etc. Some of these may be as old as the fifth century of our era. One of the earliest historic pieces is a metrical life of St. Patrick. Among the most important of the heroic tales is the *Táin Bo' Cuailnge*, or *Cattle Spoil of Cuailnge*, the center of a series of epic tales. A certain number of poems and tales, forming a cycle of their own, may be called Ossianic; most of them are comparatively modern. The glosses written to Latin works by Irish ecclesiastics, in the monasteries on the Continent founded during the seventh and eighth centuries, are among the oldest specimens of the language. Many bardic remains belong to the period of the English conquest, but after that date Irish poetry appears to have sunk. Many bards, however, who were still maintained by the native chiefs, helped by their songs to keep up a national feeling hostile to the English domination. The native authorities for Irish history may go back to St. Patrick at the very earliest. The oldest list of kings dates from the middle of the eleventh century. The oldest and by far the ablest annalist, whose works have been at least partially preserved, is Tighernach O'Brian, who belonged to the royal family of the O'Connors, of Connaught. He d. in 1088. The other chief annals are the *Ulster Annals*, the *Annals of Innisfail*, and the *Annals of the Four Masters* (from its four different compilers). The most important Irish manuscripts are contained in the library of Trinity College, and the Royal Irish Academy, Dublin, in the Bodleian Library, and the British Museum.

Ireland, John (1838–), American Catholic prelate, was b. in county Kilkenny, Ireland. His parents settled in St. Paul, Minn. Since his ordination he has been prominent as a temperance advocate. He was consecrated bishop of St. Paul, Minn., in 1875. In 1888 he was made archbishop of St. Paul. He visited the pope at Rome in 1898, and was very well received.

Irid'ium, a metal of a whitish color, not malleable, discovered in the black scales which remain when native platinum is dissolved in aqua regia; specific gravity about 2y.4, symbol Ir. It takes its name from the variety of colors it exhibits while dissolving in hydrochloric acid. It is the most infusible of metals. It forms a number of alloys, one of which, iridosmine, occurs native. The alloy with gold is malleable and much resembles gold in appearance, that with copper is very hard, pale red in color, and ductile.

Iridos'mine (Iridosmium), a native compound of iridium and osmium, forming an osmide of iridium, in which the iridium is less or more replaced by platinum, rhodium, and ruthenium. It is used for pointing gold pens, and iridium is obtained from it.

I'ris, in Greek mythology, the fleet, golden-winged messenger of the Olympian gods. Iris was originally the personification of the rainbow, though she does not appear as such in the Homeric poems. She is represented with wings attached to her shoulders and a herald's staff in her left hand, representative of her office of messenger.

Iris, the muscular curtain stretched vertically in the anterior part of the eye, perforated by and forming the colored circle around the pupil.

Iris, a plant that is also called flag and fleur-de-lis. The plants of the genus *Iris*, some of which are medicinal and others merely ornamental, are found in many localities over Europe, Asia, and America. They usually grow in wet places, bearing flowers of various colors, but the prevailing tint is blue. The common British species has yellow flowers. The stinking iris of Southern England has purple flowers and ill-smelling leaves. Orris root consists of the rootstock of some species, and the rootstock of this and other species are cathartic or emetic. Many beautiful species are grown in gardens. The most admired species are the Persian, the snake's head, the Chalcedonian, the Spanish, and the English.

Yellow Iris; *a*.—seeds.

Irish Moss, a seaweed very common on rocks and stones on every part of the coast of England and Ireland. It is a variable weed

Irish Moss or Carrageen:
A, B, C, different forms of growth.

with a flat branching frond usually of a deep purple-brown color. When dried it becomes whitish and in this condition is known as Irish moss. It is used for making soups, jellies, size, etc. The name comes from Carragaheen, near Waterford, Ireland.

Irish Sea, the sea between Great Britain and Ireland, n. of St. George's Channel and s. of the North Channel, 130 mi. long and about 60 mi. wide. It contains the islands of Anglesey and Man.

Iri'tis, inflammation of the iris of the eye. The symptoms of iritis are a zone of a pale pink color round the cornea, formed by vessels transversing the sclerotic; and the iris itself undergoes a remarkable change of color. The patient experiences pain in the orbit of the eye, in the forehead, and side of the head, which frequently grows more intense at night. Iritis may arise from wounds in the iris, from too prolonged continuous use of the eye, or from constitutional predisposition induced by syphilis, scrofula, etc. It may be treated according to circumstances by blood-letting, belladonna, and mercury.

Irkutsk', a town in Southern Siberia, capital of government of same name. It manufactures woolens, linens, leather, etc., and carries on a good trade in tea and other articles imported from China, furs, etc. Pop. 36,117. The government, which is bounded by Yeniseisk, Yakutsk, Trans-Baikalia, Lake Baikal, and Chinese Turkestan, has an area of 309,190 sq. mi., and a pop. of 398,873, a number of whom are persons banished from Russia.

Iron, the most useful of all metals, is found in almost every form of earth, clay and rock. Iron is a hard, silver-gray metal, and capable of being worked into many different forms. Its general utility is well described in Dr. Ure's *Dictionary of Arts, Manufactures and Mines,* where this paragraph descriptive of iron occurs:

"Capable of being cast into molds of any form; of being drawn into wire of any desired strength or fineness; of being extended into plates or sheets; of being bent in every direction; of being sharpened or hardened at pleasure."

Iron does not occur in a pure state, except in very small quantities and in rare instances. All the iron in use in the industrial arts is obtained from ores, which are combinations of iron with other substances, and occur in the form of rock. The most important are:

1. *Red hematite,* or *specular iron,* a sesquioxide, containing about 70 per cent iron and 30 per cent oxygen. This ore occurs as a reddish-brown rock.

2. *Brown hematite,* a sesquioxide containing water in proportion of 86 parts of one to 14 of the other. This ore is often found in bogs and old lake bottoms, since it has been formed by the action of water on other ores.

3. *Magnetic iron ore* or *magnetite,* a combination of sesquioxide and protoxide of iron in proportion of 69 of the former to 31 of the latter. Magnetite is of a black color and often has a high luster. It occurs in massive form in rock and also in fine particles in sand.

4. *Carbonate of iron* or *spathic iron,* a compound of protoxide of iron and carbon dioxide. This ore has a slightly yellowish color and turns brown when exposed to the weather.

By far the largest quantity of iron comes from the red hematite, as shown by the following summary made from carefully compiled statistics of the production of iron in the United States for the years 1900 and 1901:

Red hematite.....	78.58 per cent.
Brown hematite....	13.28 per cent.
Magnetite	7.57 per cent.
Carbonate	.57 per cent.

The relative production from red hematite has increased and that from each of the other ores has slightly decreased since 1890. This change is due to the development of the mines in the Lake Superior region, as the ore of these mines is almost all red hematite.

Charles W. Sisson in his work on iron shows the comparatively small areas from which nearly all the iron ore in the United States is taken. He shows that if a circle were drawn with its center in Lake Superior and having a radius of 135 miles all the iron ore producing territory of the Lake Superior region would lie within one-half of the circle, and that most of the deposits would be near the periphery. A circle 100 miles in diameter would include the iron producing areas of Alabama and Georgia; a parallelogram 60 miles long and 20 miles wide would embrace all the valuable mines of the Lake Champlain district in Northern New York, and Lebanon County would include the valuable mines of Pennsylvania.

The total production of iron ore in the United States for 1900 was 27,553,161 gross tons; of this amount the Lake Superior region produced 19,059,393 tons, and the Alabama, New York, Pennsylvania and other smaller areas the balance. Our annual production of iron ore since 1898 has never been equalled by that of any other country. The nearest approach to it was made by Germany in 1900, when her output amounted to 18,667,950 gross; this was nearly 2,000,000 tons less than the output of the Lake Superior region for the same period.

The principal iron ore producing states in the order of their production are: Minnesota, Michigan, Alabama, Pennsylvania, New York, Virginia, Wisconsin, Tennessee, New Jersey, Georgia, Colorado, Missouri, and Ohio. Iron ore is also mined to some extent in Kentucky, Texas, Massachusetts, Maryland, Connecticut, North Carolina, West Virginia, Idaho, Maine, Montana, Oregon, New Mexico, and Utah.

Ores of iron contain impurities such as carbon, silicon, phosphorus, sulphur, tungsten, and chromium. Were it not for the presence of some of these so-called "impurities," iron as a useful metal would have a limited use, for chemically pure iron is of no practical value in the industrial arts. It is a laboratory product only. The presence or the absence of one or more impurities, alone or in combination, give to iron certain characteristics, temperaments, physical properties, which in turn

give that wide versatility and those manifold properties that make iron the king of metals and the best friend of man that comes from the reduction of ores.

After the iron ore is mined it is taken to the blast furnace, in which the iron is separated from the other materials found in the ore. Pure iron ore is a chemical combination of metallic iron and oxygen, running about 70 per cent. iron and 30 per cent. oxygen. But iron, as it comes from the mines, is a combination in varying proportions, of some of the following: iron, oxygen, sulphur, silica, alumina, phosphorus, carbonate of iron, carbonate of magnesia, manganese, water, etc. The pig iron resulting from the action in the blast furnace contains from 90 to 94 per cent. pure iron, and 6 to 8 per cent. impurities. The principal impurities are carbon, silicon, phosphorus, sulphur, and manganese.

Carbon exercises the greatest influence on iron. The proportion of carbon in iron makes the metal cast iron, steel, or malleable iron. Carbon gives to iron different characteristics, for it affects the strength, color, fusibility, and hardness. It is found in pig iron as free carbon or as combined. Graphitic or free carbon occurs in pig iron known as gray or foundry irons, in thin flakes, giving the dark color characteristic of that grade of pig iron. In this form it tends to make iron soft and tough, but weaker and less tenacious than when in the form of combined carbon.

As silicon and sulphur lower the carbon-absorbing or combining capacity of iron, and as manganese enables iron to take up more carbon, the amount of carbon which iron can take up depends on the amount of sulphur, silicon, and manganese present in the iron. When manganese is not present in cast iron, the iron will not hold more than 4.5 per cent. of carbon, but an increase of manganese gives an increase of carbon up to as high as 6 per cent. The average proportion of carbon in various grades of pig iron ranges from about 3 per cent. to 3.5 per cent.

Silicon, after carbon, is the commonest element in cast iron. Pig irons, which have a considerable amount of silicon in them, are known to foundrymen as "softeners," for silicon is a softening element. Iron will take up silicon to a proportion of 30 per cent. of the element. Silicon increases the fluidity and fusibility of iron, and takes away the appetite of iron for carbon, not only when the iron is in a molten condition, but when it is at a white heat. This favors the formation of free carbon in cooling, and makes the iron soft. Silicon in iron also reduces shrinkage, and has a tendency to prevent blow holes in castings. Foundry irons contain from 1 to 5 per cent. of silicon. When the proportion of silicon is from 5 to 14 per cent., the alloy is called ferro-silicon, and ferro-silicon is used as a softener.

Phosphorus weakens iron, and makes it "cold short," that is brittle when cold. It is found in pig iron from a mere trace up to 1½ per cent. Phosphorus is exceedingly difficult to remove, for it is not volatilized to any extent in the blast furnace, and hence passes again into the metal. In the cupola of the foundry it cannot be eliminated. It is only removed by intense heat in the puddling furnace, and in the basic process. Phosphorus tends to make molten iron extremely limpid, so that fine, sharp castings can be taken from delicate patterns, and it lessens shrinkage. Foundry men regard pig iron containing more than 0.8 per cent. of phosphorus, as poor iron.

Manganese, physically and chemically, closely resembles iron. It generally is present in pig iron, and has been made to replace metallic iron to the extent of 85 per cent. Manganese has a tendency to remove sulphur from cast iron, and assists in the prevention of blow holes. Manganese also increases the hardness of iron, and tests have demonstrated that an increase of 1 per cent. in manganese increases the hardness from 30 to 40 per cent. This hardness of manganese enables the intelligent foundryman to produce hard chills. In the cupola, much of the manganese passes away in remelting, in the slag, and in so doing carries off sulphur, thus preventing red shortness. Pig iron which contains from 5 to 30 per cent. of manganese is called "spiegeleisen" (looking-glass iron), and is used in the Bessemer steel process. When iron is alloyed with 50 per cent. and more of manganese, it is called ferro-manganese. The bulk of this alloy, containing 80 per cent. manganese, comes from England and Germany. The presence of manganese in iron increases the power of carbon to combine with iron at a high heat, and for this reason it is used in making Bessemer steel. (See *Steel.*) Commercial pig iron contains manganese from a trace to 2 per cent. Foundrymen say that manganese should not exceed 0.5 per cent. in foundry iron on account of its tendency to make iron hard and brittle.

Sulphur is regarded as the worst foe of iron. It will unite with iron up to 53 per cent, and it makes iron "red short," that is, brittle when heated. It also makes iron hard and white. It causes blow holes, and makes molten iron sluggish in running from the ladle. Most of the sulphur found in cast iron is absorbed from the fuel, and for this reason, coke with sulphur from 0.75 to 0.90 per cent. is rejected by foundrymen. Lime is used for desulphurizing iron, and manganese and flour-spar also used to eliminate sulphur.

History of Iron.—Iron was known to the ancients, and there are evidences that the metal was worked with a considerable degree of intelligence in days that might be called prehistoric. Moses, in Gen. 4:22, refers to Tubal Cain as a worker or artificer in brass and iron, but not as a maker. This is taken by some writers on the early history of iron to mean that Tubal Cain found masses of meteoric iron, and hammered it into shape, either cold or hot. But in the book of Job, which by many writers is said to antedate the writings of Moses, iron is spoken of as being extracted from the earth. This would indicate that the first metal workers understood the art of mining and smelting. In parts of Asia and Africa

iron ore to-day is smelted in a crude way, probably as the first iron workers treated the ore. The furnace is nothing but a hole in the ground, filled in with charcoal and iron ore, and combustion is promoted by the breath or by fans made from large leaves.

In Deut. 4:20 Moses writes of the Jews, in servitude in Egypt, as working in the iron furnaces, and in Deut. 7:9 he speaks of Canaan, the land of promise, as a "land whose stones are iron." The Egyptians undoubtedly were familiar with the working of iron and steel, for Herodotus describes the iron tools used in building the pyramids, and in the tombs of Thebes and Memphis, cities so old that their origin is lost in obscurity, butchers are shown using tools, and the colors indicate that the tools were iron or steel. When the obelisk was removed from Alexandria, Egypt, in 1880 to New York, a piece of pure iron was found under the base of the monolith, and it is estimated that this bit of iron was more than 1,900 years old. In the British Museum are tools made of iron and steel which are more than 3,000 years old. Grecian and Egyptian mythology credit the invention of iron manufacture to the gods, indicating the great antiquity of the art. Ancient metallurgists worked two kinds of iron ore; one which was so pure that it required no preliminary treatment before smelting, and the other an impure ore which required to be broken, washed, and roasted, to prepare it for the smelting furnace. In the early days the furnaces produced iron or steel by chance, according to the amount of carbon in the ore. When Rome fell Spain revived the iron industries, and the Spanish "catalan" furnaces gave Spain pre-eminence for years in the making of iron and steel. The catalan furnace took its name from the province of Catalonia, in the north of Spain, and its use gradually spread into Southwestern Europe. Catalan furnaces are used to-day where the ore is of a nature that will permit its being worked in the low blast furnaces called "catalan." In Spain to-day the catalan furnace is a four-sided cavity or hearth, placed in a building, and separated from the main wall by a thinner, interior wall which forms one side of the furnace. The blast comes through the wall, and is produced by a fall of water. The blast so produced is of great regularity, but the air is moist.

Iron ore, to be treated in a catalan furnace, must be pure. When it was found that all ores could not be smelted in such furnaces, furnaces were built higher, with an opening in the top. The broken ore was thrown in through this opening, and thus the modern blast furnace was born. It is said that the blast furnace of which those used to-day represent the highest form of development, originated in the Rhine provinces, about the beginning of the fourteenth century, and France, Belgium, and Germany claim the honor of being the native country of this most important improvement. Landrin claims that there were many blast furnaces in France before 1450. Alexander writes of a blast furnace in the Hartz Mountains, Germany, in the latter half of the sixteenth century, which was 24 ft. high, and 6 ft. wide at the boshes.

Blast furnaces were introduced in England in the beginning of the fifteenth century, and in the reign of Elizabeth they were large enough to produce from two to three tons of pig iron a day with charcoal fuel. Previous to the introduction of blast furnaces in England, all the iron produced in that country came from catalan forges or high bloomeries, made direct from the ore. This product was wrought or bar iron. Wood for making charcoal in England became scarce, and efforts were made to use pit coal for fuel, but with small success owing to the opposition from charcoal makers. But in 1733, Abraham Darby of Shropshire, England, in his furnace at Coalbrookdale, made the first successful blast with coke as fuel. In 1760 John Smeaton invented the cylindrical cast-iron bellows, and as this took the place of the leather and wooden bellows used up to that time, the art of smelting iron received a great impetus. But when Dr. Roebuck, of the Carron Iron Works, Scotland, coupled the steam engine of James Watt to Smeaton's iron bellows, the production of iron was increased to such an extent that the event is of historical importance. In 1828, James Beaumont Neilson, a Scotchman, invented the hot blast which now is in general use.

Iron was discovered in America, in North Carolina, by the expedition fitted out by Sir Walter Raleigh in 1585, but no attempt was made to utilize the find. The first iron made from American ore was smelted in England. The iron ore was shipped from Virginia in 1608. In 1619 the Virginia company attempted to make iron in Virginia, but the attempt failed. Between the years 1643 and 1645 the first iron works were built in America, in the province of Massachusetts Bay, not far from the present site of Lynn. The place was called Hammersmith, and the first product of an American iron furnace was a small iron pot, which still is in existence. The ore used was bog ore which still is found near Lynn, and Joseph Jenks, a native of Hammersmith, England, was the first iron founder to successfully make iron in America.

In 1783, Henry Cort, of Gosport, England, was granted a patent for rolling iron into bars by means of grooved rolls, and the next year he obtained a patent for a puddling furnace. Prior to Cort's time, iron was shaped under hammers operated by water power. But plain rolls were used for rolling sheet and plate iron before Cort's invention. He was the first to use grooved rolls for reducing iron to bars.

Iron-working Processes. — The sequence of processes which transform iron ore into commercial, wrought, or cast iron begins with the blast furnace. In the stack of this furnace the metallic iron is separated from the earth, stone, and other impurities which make up a large part of the ore. The blast furnace is shaped somewhat like an inverted bottle. An ordinary furnace is about 80 ft. high, and is 23 ft. in the inside diameter at its widest point,

which is about 24 ft. from the bottom. From this point the furnace tapers both ways, but more sharply toward the ground. At a distance of about 8 ft. from the bottom, the furnace becomes cylindrical. The top of the furnace, where the iron ore, coke, and limestone are charged, is called the "throat;" from there down to the widest part is the "stack;" the lower part is the "bosh;" the cylindrical part is the "hearth;" and at the bottom is the "crucible," in which the molten metallic iron collects. The greatest heat is found in the hearth. About 4 ft. from the bottom of the furnace are the tuyers, through which the blast of air is introduced into the furnace, and the tapping hole is at the bottom. The blast is heated by the hot gases which are generated in the furnace, and which are caught at the throat and sent down through a goose neck to the "stove," so that the heat is returned to the furnace again.

In the first quarter of the nineteenth century the manufacture of pig iron in the U. S. was in a primitive condition. The metal was made almost altogether in blast furnaces which used charcoal for fuel, and the larger furnaces produced only about 25 tons of pig iron a week. About 1840 the use of coke and anthracite coal was introduced. This required a much higher pressure of blast, and this blast was cold. The demand for more powerful blowing engines resulted in the production of engines of which the modern type is the development, and the introduction of the hot blast gave the blast furnace added efficiency, and greater opportunity for augmented production of pig iron. In 1864 the Bessemer process for making steel was introduced in the U. S., and pig iron men began to appreciate the fact that iron smelting was a chemical process and not a simple melting one. In 1864 the average furnace had about 2.000 cu. ft. capacity. At the present time (1902) there are blast furnaces with a cubical capacity of 18,200 cu. ft., capable of producing 3,000 tons of pig iron a week. A sample furnace is one of the Illinois Steel Company in Chicago. It is furnace No. 7, and is 85 ft. in height, 20 ft. in diameter at the bosh, 13 ft. at the hearth, and 15 ft. at the top. It has averaged 350 tons of pig iron a day, using 1,620 lbs. of coke for every ton of iron made. In making a ton of iron, 3,716 lbs. of iron ore, 56 llbs. of limestone, and 90 lbs. of scrap iron were required to be used. The average amount of air blown was 30,320 cu. ft. per minute, at an average pressure of 9.4 lbs., and a temperature of 1,135° F.

Limestone is used as a flux. It might be called a medicine which acts upon the impurities of the iron in such a manner that a large percentage is extracted, floats away on top of the molten metallic iron to be drawn off by itself. The ore, limestone, and coke are introduced into the furnace at the top, and the hot blast, forced through the tuyers near the bottom, raise the temperature to a melting degree at the zone of fusion, which is just below the point where the bosh joins the hearth. At this point the metallic iron becomes liquid, and trickles down through the mass of incandescent coke until it falls into the crucible. On top the melted slag floats, and this is first drawn off, then the furnace is tapped, and the molten iron runs out into a channel made in the sand floor of the furnace house. This channel leads to cross channels, and these into the open molds in which the pig iron is cast.

The pig iron has more carbon in it than tool steel; it is coarse grained, and has more or less silicon, sulphur, phosphorus, and other impurities in it. It cannot be worked under the hammer until its structure is changed, and almost all the carbon and other impurities are worked out of it. This is done in the puddling furnace, and puddling is the second process through which the iron must pass before it becomes wrought iron. The puddling furnace was invented by Henry Cort about 1780. He used sand as the bed of his furnace, consequently when the pig iron was melted, the iron became grained. Samuel Baldwin Rogers substituted iron plates for sand. The puddling furnace is made of two parts—one for the fire and the other for the hearth. These parts are divided by a fire or bridge wall, so that the iron does not come in direct contact with the fuel. The roof is somewhat arched, and the flame curling over the bridge wall strikes the roof and reverberates downward, so that this form of furnace has come to be called reverberatory.

The pig iron, broken in small pieces, is thrown into the hearth, the bottom of which is covered with furnace cinder or iron scale. The heat is urged by a blast which performs a double office, for it not only forces combustion, but the oxygen in the blast decarbonizes the iron. The iron, melting, spreads over the bottom of the hearth, and the impurities float on top of the mass, and are drawn off. The puddler, as soon as the iron is melted, begins working it with a long iron tool, called a "rabble." The iron, under the influence of heat, and the chemical reaction, boils and bubbles briskly, and the puddler, with his rabble, turns the metal and stirs it constantly, so as to expose all parts of the iron to the passing air. A "fettle," which is pulverized, rich iron ore, free from phosphorus and sulphur, is added at times to keep the iron from wasting while undergoing destructive purification. In time the iron becomes pasty, for the constant stirring with the rabble, and the decarbonization, transforms the pig iron into wrought iron. The puddler then works the pasty material into a puddle-ball, which is carried to the "squeezers," where a considerable portion of the cinder and impurities are pressed out of it. The "squeezer" turns out a roughly-shaped, elongated cylinder of wrought iron, and this is passed through the puddle mill into slabs or "muck bars." These slabs are cut up into shorter lengths, made up into bundles or faggots, and placed in a heating furnace, somewhat similar in shape to a puddling furnace. In this furnace the bundle of muck bars is heated to a welding heat, and rolled down into a solid bar of wrought iron. Hand

puddling is exceedingly laborious, and in some mills mechanical puddlers have been substituted for the human puddlers. The mechanical puddler is of two forms—the "mechanical rabble," which is worked through the "stopper hole" in the door as the hand rabble is operated, except that motion is given by machinery outside; and "rotary puddling furnaces," in which the hearth is barrel or globular shaped, and is made to revolve by suitable machinery, thus mechanically exposing all parts of the iron to the air blast.

Rolling mills, whether used for working puddle-balls into bars, rods, sheets and plates, for rolling steel rails and other shapes; or for reworking scrap iron into merchant iron, are alike in general construction and operation. The principal feature of a rolling mill is the train of rolls, which extends well across the mill, over a pit, with suitable heating furnaces, shears for cutting iron, cooling beds, and boilers and engine. The train of rolls consists of a series of iron rollers, arranged in "housings," which are heavy iron frames. Each set of rolls is contained in a pair of housings, and the rolls stand over each other in a horizontal position, two high and three high. Pinions, heavy cog wheels, revolve them in opposite directions, so that the iron when introduced between the rolls is drawn through from one side to the other. The rolls next to the driving pinions are driven by pinions; they in turn drive the next set of rolls through cast-iron couplers, and the power is thus transmitted through rolls and couplers down the train. As the heaviest work is done by the roughing rolls, which take the heated iron first, they are placed next to the driving pinions. The main train comes next, in which the iron is taken from the roughers and rolled down nearer the finished section. The finishing rolls come last in the train, in these rolls the iron is finished, and is taken away to the cooling bed, where it is allowed to remain until black cold, when it is trimmed to length.

The rolls are grooved, and the grooves are called "passes." It is the form of the passes which gives form to the iron bar. They are diamond-shaped in the roughing rolls, and are oval, flat, square, diamond, and other shapes in the finishing rolls. In rolling heavy masses of iron, the rollers and catchers are aided by men with hooks, either light hand hooks, or heavy hooks held by chains or rods suspended from above. A sheet or plate mill has smooth rolls, sometimes 108 in. long, and the iron is handled on tables which lift the sheet or plate from the lower to the upper rolls.

Cast-iron forms are molded and cast in a foundry. The pig iron is remelted in a cupola, which is a vertical furnace in which the iron is melted, and tapped out into ladles. The molten iron is poured into sand molds. The cupola is cylindrical in shape, and, for a five foot job work cupola, is lined with fire brick to make an inside diameter of about 42 in. They range in height from 8 to 12 ft., but some are much larger. The "stack" is supported on legs which elevates it so that the tap hole is about 4 ft. from the ground. The real bottom of a cupola is a sand bottom, which rests on a false bottom. This false bottom is hinged, so that it can be dropped to remove the ashes. The cupola is provided with tuyers, and the blast is made with a revolving fan. Coke, pig iron, and scrap iron are charged into the cupola at the top, and the melted iron is tapped into a spout through which it runs into the hand ladles or ladles carried on wheels or by a crane. A good working cupola will melt ten tons of pig iron with one ton of coke, but the average is 6 to 8 tons of iron to 1 ton of coke. The molders, with patterns, make molds in sand, which is held in blasks or boxes, and the iron is run into the molds through an opening left in the sand for that purpose.

Cast-iron castings are made malleable, to a certain extent, by packing them in powdered hematite (peroxide of iron) or iron scale, in tight, fire brick cases, and subjecting them to a continuous red heat for many hours. They are then allowed to cool gradually, and the brittleness of cast iron is removed. This is secured by the oxygen of the packing combining with a part of the carbon in the iron. A surface chill is given iron castings by pouring the melted iron against an iron plate or wet sand.

Wrought iron melts at a temperature of 3,080° F.; cast iron at a temperature of 2,210°, according to tests made by the United States Ordnance Department. Charcoal pig iron has a mean transverse strength of 9,449 lb. per sq. in., and a tensile strength of 27,232 lb. The mean strength of American wrought iron is 35,900 lb. A cubic foot of wrought iron weighs 480 lb.; a sq. ft. 1 in. thick, 40 lb.; a bar 1 in. sq. and 1 ft. long, 3⅓ lb.

Recent Developments.—The recent development in the iron and steel industries, and the manifold uses to which iron in all its many forms has been put are such as to make the term "Iron Age" particularly applicable to the present era. While this development has been more extensive in the United States than elsewhere it has by no means been confined to this country. Great Britain, Germany, France, Belgium, and Norway and Sweden have also shared in the expansion of the iron and steel trade. The production of iron and steel on a large scale began soon after the Civil War, and for 20 years (1870–1890) the gain was extraordinary, the total product for 1870 being 3,655,215 tons, and for 1890, 18,216,215 tons. The Bessemer process for making steel was invented in 1856, but it was some years before it came into general use. When its advantages were realized, however, it was universally adopted, and it is conceded that no other invention has done more to revolutionize the industrial world during the 19th century than this process of refining iron. Steel soon began to take the place of iron in nearly all structural work, and the increase in the production of steel was greatest between 1880 and 1890. While in the following decade (1890–1900) the increase was rapid, it was not equal to that in the previous decade. The pe-

riod since 1890, however, has witnessed a marked advancement in the position of the United States as an iron-producing country, until in 1902 she led the world. This advancement is shown by the following statistics:

1900.	Iron. (Tons.)	Steel. (Tons.)
United States	13,914,599	10,980,000
Great Britain	9,150,000	5,100,000
Germany	8,406,370	6,780,000
Belgium	975,000	.....
United States, 1901	15,878,354	.....

The production for 1901 was 2,089,112 tons in excess of that for 1900. Bessemer iron comprised 9,596,793 tons of the product and basic pig 1,448,850 tons. The leading states for 1901 were:

	Tons.
Pennsylvania	7,443,257
Ohio	3,326,425
Illinois	1,596,850
Alabama	1,225,212

The greatest activity in mining iron ore has been in the Lake Superior region. A careful estimate of the product of these mines for 1902 places their output at 27,650,000 tons, distributed as follows:

	Tons
Minnesota mines	16,500,000
Michigan and Wisconsin	10,300,000
Other sources	850,000

The enormous demand for ore from this region has led to the invention of many labor-saving devices for handling and shipping. The ore in the surface mines is scooped up by steam shovels that carry 5½ tons to the shovelful and placed directly on the cars. The ore trains are run upon the docks and the cars are dumped into chutes from which the ore is carried to the vessels. These vessels have a capacity ranging from 5,000 to 8,000 tons, and can be loaded in from 3 to 5 hours. Devices for unloading are approximately efficient. An arrangement for unloading cars in use by the United States Steel Corporation clamps the car to a section of track on a platform, and then moves car and track through a half of a vertical circle, turning the car bottom side up and dumping the ore. By this means 300 cars of 50 tons each can be unloaded in 10 hours.

A careful study of our advancement in the iron and steel industry shows that it has been due to American methods of organization and the employment of labor-saving machinery. By these means large aggregations of capital can be so employed as to yield the largest production of iron of the best quality at the least expense. The value of our exports of iron and steel now far exceeds that of our imports. For 1900 this value was $129,633,840.

The effect of improved methods of production on the price of the product is seen by comparing the prices for steel rails during the last three decades. In 1868 the price was $174 a ton; in 1878 it was $41.50; during the next ten years it fluctuated between $85 in 1880 and $31.50 in 1888. In 1898 prices had fallen to $18, but in Dec., 1899, they had risen to $37, and in 1901 it ranged from $26 to $28.

Iron Age, an archæological term indicating the condltion as to civilization and culture of a people using iron as the material for their cutting tools and weapons. It is the last of the prehistoric stages of progress represented by the series of the three ages of Stone, Bronze, and Iron. But it has to be remembered that this sequence is not necessarily true of every part of the earth's surface, for there are areas, such as the islands of the South Pacific, the interior of Africa, and parts of North and South America, where the peoples have passed directly from the use of stone to the use of iron without the intervention of an age of bronze. In Europe the Iron Age may be defined as including the last stages of the prehistoric and the first of the protohistoric periods. As the knowledge of iron seems to have traveled over Europe from the south northward, the commencement of the Iron Age was very much earlier in the southern than in the northern countries. Greece, as represented in the Homeric poems, was then in the transition period from bronze to iron, while Scandinavia was only entering her Iron Age about the time of the Christian era. The transition from bronze to iron in Central Europe is exemplified in the great cemetery, discovered in 1846, of Hallstatt, near Gmunden, where the forms of the implements and weapons of the later part of the Bronze Age are imitated in iron. In the Swiss or La Têne group of implements and weapons the forms are new and the transition complete. The early Iron Age forms of Scandinavia show no traces of Roman influence, though these become abundant toward the middle of the period. The duration of the Iron Age is variously estimated according as its commencement is placed nearer to or farther from the opening years of the Christian era; but it is agreed on all hands that the last division of the Iron Age of Scandinavia, or the Viking Period, is to be taken as from 700 to 1000 A.D., when paganism in those lands was superseded by Christianity. The Iron Age in Europe is characterized by forms of implements, weapons, personal ornaments, and pottery, and also by systems of decorative design, which are altogether different from those of the preceding age of bronze. The implements and weapons are no longer cast but hammered into shape, and as a necessary consequence the stereotyped forms of their predecessors in bronze are gradually departed from, and the system of decoration, which in the Bronze Age consisted chiefly of a repetition of rectilinear patterns, gives place to a system of curvilinear and flowing designs. But the principal feature that distinguishes the Iron Age from the preceding ages is the introduction of alphabetic characters, and the consequent development of written language which laid the foundations of literature and historic record.

Ironclad Vessels

Ironclad Vessels (or Armor-clad Vessels), a term now applied to all vessels protected from the fire of heavy guns by thick plates of iron or steel, usually backed by wood. The ironclad is comparatively a modern invention, and it was not until 1859 that Britain began to introduce such vessels into her navy; but since that time greater changes have taken place in the construction of warships than in all previous ages. Before the present century we have no record of vessels being fortified with iron plates, and the idea was first practically applied to some floating batteries by the French in the Crimean War. The improved shells played such havoc in the crowded 'tween decks of the line of battle ships then in use, that some extra protection became absolutely necessary. The first ironclad, *La Gloire*, was constructed by the French in 1858, a wooden ship sheathed from end to end in 4½ in. iron plates, an armor then considered invulnerable. It was evident that Britain must not only take up the idea of the French, but also improve upon it, and this led to a period of unexampled activity in the naval yards of both countries. No sooner had France launched an ironclad than Britain replied with another, although the former managed to keep the lead for some years. The first British ironclad, the *Warrior*, was launched in the Thames in December, 1860, an iron frigate with air-tight compartments, 4½ in. iron armor and 18 in. wood backing, the two ends of the vessel unprotected. The French continued to build their vessels of wood for some years, while the British started at once with iron, which gave the advantage of extra lightness for the same strength. Ironclads may be divided into the three chief classes of broadside, turret, and barbette vessels. *La Gloire* and the *Warrior* carried their guns on the broadside like old wooden frigates, but as the number of guns carried was reduced as ordnance grew heavier, and all-round firing was found expedient, it was deemed necessary to limit the masses of armor by applying it to the most vulnerable parts only, and adopting various methods for attaining all-round firing. This brought about an entire new departure in shipbuilding; the construction of *turret ships*, or ships having a revolving covered turret or turrets rising above the deck and containing the chief guns, the turrets being of great strength, and having openings for the muzzles of the guns. The turret ship is the invention of Ericsson in 1861–64 for the U. S. navy, and the advantage of his system was fully demonstrated in the successful conflict of the turret ship *Monitor* with the broadside ship *Merrimac*, in the American Civil War. Representatives of British sea-going turret ships are the *Inflexible*, *Ajax*, *Sans Pareil*, *Victoria*, *Trafalgar*, and *Nile*.

Ships on the *barbette* system have open towers or turrets rising above the deck, containing heavy guns which fire over the edge of the turrets (thus giving an extensive range), the guns in some cases being raised to fire and lowered to load so as in the latter case to be protected. The barbette type was a French introduction, and its principal advantage is the height at which guns can be carried above water-line, not, however, without a considerable exposure of guns and crew. The *Benbow*, *Rodney Howe*, and *Camperdown* are good British representatives of this system, these being also members of what is known as the "admiral" class, a common feature of which is steel-faced 18 in. side armor, and a central citadel having two barbette towers. The manner in which the armor is distributed varies greatly in different ships. In the *Inflexible* (to which the *Agamemnon* and *Ajax* are similar) only a portion of the ship is armor-plated, a part of its bulk being merely intended to float and move the iron citadel, which forms the most important feature of the vessel. This is a rectangular armored castle 110 ft. in length, 75 ft. in breadth, and 15½ ft. in height, 6½ ft. being below and the rest above the water. Within this are included the engines and boilers, the base of the ponderous iron turrets, the hydraulic loading-gear, and the magazines. The walls have a uniform thickness of 41 in., and consist of armor plates varying in thickness from 16 in. to 24 in., with strong teak backing between and behind the plates, the backing varying in thickness inversely to the thickness of the plating. In the central part of the citadel rise the two turrets 12 ft. high and 28 ft. in internal diameter, of iron of the thickness of 18 in. In each turret are two 81 ton guns. Nearly every armor-clad vessel is fitted with some sort of ram; the ram being a more important feature in some than in others. The *Polyphemus* is entirely a torpedo ram, this ship being a deeply immersed steel tube with a convex deck rising a short distance above the water, the bow forming a ram and containing a tube for projecting torpedoes. Among the most advanced specimens of naval construction at present are believed to be the sister ships *Trafalgar*, launched 1887, and *Nile*, 1888. These are turret vessels, with a displacement of 11,940 tons, and are now the largest in the British navy, and probably the best equipped in the world. They have a steel armor of 20 in. in a belt extending almost the length of the ship on either side, 16 to 18 in. on citadel, 18 on the turrets, while a 3 in. steel deck covers the vital parts fore and aft. Each of them has no less than 76 separate steam or hydraulic engines, including propelling machinery, and carries four 67 ton breech-loading guns. They cost nearly a million sterling each. More useful in many respects than these huge vessels are smaller cruisers of great speed and coal-carrying capacity. Six of these, all 5,000 tonners, were launched in 1887, and others since. Two first-class cruisers, the *Blake* and the *Blenheim*, are of 9,000 tons and 20,000 horse power, with a speed of 22 knots. According to the admiralty programme adopted in 1889, eight first-class battle ships were to be speedily built, with a displacement of 14,000 tons each, and a speed of 17½ knots; also two second-class battle ships, and forty-two armored cruisers. As to the best material for armor plates, it is not yet decided whether solid steel or steel-

faced armor is preferable; excellent results have been obtained with composite plates, composed of steel and iron in layers. Since protective armor has come into use the number of guns carried by a war ship has been greatly reduced, while the size and weight of the guns has immensely increased. Modern first-class war ships have usually two or four very large guns for the turrets or central citadel and six or eight smaller (but still large guns) for the sides, besides machine guns.

Next to Great Britain, France has the greatest number of ironclads, Italy, Russia, and U. S. ranking third, fourth, and fifth respectively as maritime powers. The French, combined with either of these three fleets, would outnumber the British fleet. Italy has the distinction of possessing the two largest ironclads in the world. The *Italia* and *Lepanto* have a displacement of 13,835 tons, with a speed of 17 knots. According to a statement of the first lord of the admiralty, Britain in 1889 was 30 to 40 per cent. stronger than the next strongest naval power; her relative position is probably stronger since.

The U. S., after long delay, is coming to the front as to the power and improved armament of her naval vessels. She now has 17 battleships of the first class and several others in the process of construction. She has 18 battleships and 34 cruisers in commission, and our navy is exceeded by that of Great Britain only in respect to these classes of ships.

Iron Crown, a golden crown set with precious stones, with which anciently the kings of Italy, and afterward the German emperors, were crowned, when the latter assumed the character of kings of Lombardy or Italy. It has received the above name from an iron circle in it, forged, according to tradition, from a nail of the cross of Christ. It was worn by Charlemagne, by Charles V, and by Napoleon I.

Iron Gate, a narrow part in the course of the Danube below where it leaves Austrian territory and becomes the boundary between Servia and Roumania.

Iron Mask, THE MAN WITH THE, an unknown personage kept in various French prisons, who for a long time excited much curiosity. All that is known of him is that he was above middle height, of a fine and noble figure, and delicate brownish skin; that he had a pleasant voice, was well educated, and fond of reading and guitar playing, and that he died in the Bastile 1703. The mask he wore seems to have been of black velvet, not iron. Conjecture has given him many names. He was stated to be in turn the Count of Vermandois (a natural son of Louis XIV and De la Vallière), the Duke of Beaufort, the Duke of Monmouth, the son of Anne of Austria (mother of Louis XIV) by some favorite, and twin brother of Louis XIV, but all these assertions have been unable to stand the test of thorough investigation. What seems most probable is that he was Count Girolamo Matthioli, first minister of the Duke of Mantua, who had betrayed the interests of Louis XIV by failing to secure for him, as he had pledged himself to do, in consideration of a large bribe, possession of the fortress of Casale, which gave access to the whole of Lombardy. For this offense the court of Versailles lured him to the French frontier, secretly arrested and imprisoned him in the fortress of Pignerolo. The secret was preserved so carefully, on the supposition that Matthioli was the ill-fated prisoner, because his seizure and detention were flagrant violations of international law.

Iron Mountain, Dickinson co., Mich., near Menominee river. Railroads: C. M. & St. P., and C. & N. W. Industry, mining. Surrounding country agricultural and mineral, The town was first settled in 1873 and became a city in 1887. Pop. 1900, 9,242.

Ironstone, a general name for ores of iron, or for some of them, as the argillaceous carbonate or clay ironstone.

Ironton, Lawrence co., Ohio, on Ohio river, 30 mi. above Portsmouth. Railroads: C. D. & I. and N. & W. Industries: rolling mills, foundries, and other iron manufactures. It has extensive lumber interests, and an important river commerce. The surrounding country is mainly mineral, producing coal, iron, and fire clay. Pop. 1900, 11,868.

Ironwood, a name given to various trees from the quality of their timber. The ironwood or hop hornbean of America, is a tree with a trunk not exceeding 6 in. in diameter, with very hard wood, so heavy that it sinks in water, and foliage resembling that of birch. The species known as ironwood, are natives of the tropics, and also of New Zealand, the Cape, etc. The smooth ironwood of the Cape has long been cultivated in the greenhouses of Europe. The ebony is also named ironwood.

Ironwood, Gogebic co., Mich., on Montreal River, 240 mi. e. of St. Paul. Railroads: C. & N. W.; D. S. S. & A.; and Wisconsin Central. Industries: mining, iron foundry, two hardwood mills. Iron ore industry is the principal one. Surrounding country agricultural, mineral, and lumber. The town was first settled in 1885 and became a city in 1889. It is the center of the Gogebic Iron Range of Mich. and Wis. Pop. 1900, 9,705.

Iroquois, formerly a great confederation of Indian tribes, recognized as a distinct branch of the American family. At the beginning of the seventeenth century they included the Mohawks, Oneidas, Onondagas, Cayugas, and Senecas, and became known as the "Five Nations;" in 1715 they were joined by a related tribe, the Tuscaroras, and henceforward were known as the "Six Nations." Each tribe managed its own affairs, under its own sachems and a council of fifty sachems met annual and disposed of questions affecting the confederation as a whole. The chiefs, who, like the sachems, were of equal rank, but who owed their position to personal valor alone and did not form a hereditary body, exercised leadership in time of war only. The confederation was found by the earliest settlers in possession of the greater part of the present state of New York, but by the end of the

seventeenth century all the tribes between the Atlantic and the Mississippi, and from the St. Lawrence to the Tennessee, had been brought under its influence. With the Dutch, and afterward with the English, the Iroquois always maintained friendly relations, even taking sides with their allies during the Revolution; to the French, on the other hand, they were bitterly hostile, and their enmity had an important effect in checking the growth of French influence in North America. After the Revolution the Mohawks crossed into Canada under Joseph Brant, and are now settled on two reservations to the n. of Lakes Erie and Ontario. The Cayugas are scattered, and some hundreds only of the Tuscaroras have found a home among the Mohawks; but most of the Oneidas are settled at Green Bay, Wisconsin, most of the Senecas in Western New York, and the Onondagas still hold their beautiful valley near Syracuse, N. Y. The Iroquois probably never exceeded 25,000, and they still number nearly half as many, most of them in the U. S. Schools and missions have met with considerable success, and civilization is making marked progress among the descendants of this remarkable confederation, while some of their number have attained to distinction as soldiers, engineers, etc.

Irrawad'dy (Irawadi), a large river traversing Lower and Upper Burma from north to south, falling into the Indian Ocean by various mouths and forming a great delta. The Irrawaddy is the main artery of Burma, the bulk of the trade is carried on by its means, the valleys through which it flows are the most fertile and populous. Total length 1,200 mi.

Irreden'tists, the members of a political organization called *Italia Irredenta* (unliberated Italy), the object of which is to recover all territory formerly belonging to Italy and still under foreign yoke. The agitation is principally directed against Austria, and is most actively carried on at Trieste.

Irrigation.—Irrigation in America was first practiced by the Indians who inhabited the arid regions of the United States and Mexico. When discovered by the Spaniards, these people, by their rude methods of irrigation, were supplying small patches of land with sufficient water to enable them to raise enough maize and vegetables for their subsistence. The early Spanish missionaries in Southern California and New Mexico adopted the Indian's idea for supplying moisture to the soil and improved upon his methods. The missionary was followed by the miner, who, when he failed in the search for gold, turned his attention to agriculture and soon discovered the unusual fertility of the soil and the adaptability of the climate to a great variety of products. The Mormons, compelled by the force of circumstances, first demonstrated the practical utility of irrigation on an extended scale in Utah. Their plan was a little later adopted in developing the Greeley Colony in Colorado and has since in modified forms been extended to numerous other localities.

Irrigation, thus early employed in the arid regions of the southwest, has grown in favor and extent with the development of the country, and has contributed in no small degree to the agricultural prosperity of the sections where it is practiced. It is now quite extensively used in all of the states whose annual rainfall is insufficient for the successful growing of crops. A recent report of the United States Geological Survey shows the amount of irrigated lands in the different states in 1890 and 1900 to be as follows:

	1890. Acres.	*1900. Acres.*
Arizona	70,000	180,000
California	1,200 000	2,000,000
Colorado	1,000,000	1,500,000
Idaho	230,000	500,000
Montana	380,000	700,000
Nevada	240,000	250,000
New Mexico	95,000	150,000
Oregon	180.000	200,000
Utah	300,000	400,000
Washington	100,000	150,000
Wyoming	250.000	300,000
Sub-humid areas	70,000	80,000
	4,115,000	6,410,000

Recent extensions have brought the area of irrigated lands in the United States up to more than 7,000,000 acres.

Irrigation is necessary under the following conditions:

1. When the annual rainfall is less than 20 inches.

2. When the annual rainfall, though sufficient for agricultural purposes, is unevenly distributed through the year, the greater portion occurring in months when crops cannot be grown.

3. In the growing of such crops as rice which require the land to be flooded.

These conditions often render irrigation necessary in regions generally known as humid, and account for the irrigated districts in Texas, Louisiana, and other southern states where rice is grown.

irrigation requires three lines of work:

1. Conserving the amount of rainfall around the sources of rivers which are used to water the arid regions. This is the work of the state and national governments, and is one of the principal reasons for creating forest reserves. See *Forestry.*

2. The saving of water from melting snow and that which causes the overflow of streams during the rainy season. This requires the construction of numerous reservoirs and often involves expense too great for profitable investment of private capital.

3. Distribution of water to the irrigated districts. This is accomplished through systems of canals. One main channel conducts the water through the irrigated district and from this small canals branch out at right anlges and at frequent intervals. From these, small

canals, ditches and small channels distribute the water to all parts of the field. The plan for obtaining the water from its source depends upon the source of supply and the topography of the country. Whenever possible, streams are tapped by the canals, as this is the least expensive method. In many localities dams are constructed for the purpose of making reservoirs in which to store the surplus water for use during the dry season, or to divert the water of a stream from its original channel into the canals. In other localities the water has to be pumped to the height of several thousand feet in order to reach the irrigated surface. In some sections of Arizona and other localities, the water is obtained from artesian wells. When possible, the wells are so located as to do away with the necessity of canals and large ditches.

Irrigation is available for small farms only and is suited to intensive farming, such as fruit growing. In some instances cereals can be raised with profit by irrigation, and in some localities it is resorted to for the purpose of growing forage plants. The average size of the irrigated farm in the United States is 68 acres. In Utah it is 27 acres, and in the fruit-growing regions of California many of the farms are from 10 to 20 acres each. The income from irrigated lands ranges from $10 to $20 an acre, being $15 for the irrigated district as a whole. The value of irrigated land ranges from $50 to $500 per acre, according to location and products. Only from 20 to 30 per cent of the farms upon which irrigation is practiced is actually watered, there being an insufficient supply of water for the remainder.

Government Aid.—The United States government still owns about one-third of the land of the country, exclusive of Alaska. Most of this is in the arid regions, and much of it has a highly fertile soil capable of sustaining a large population if it could be supplied with water. The development of irrigation has now made use of all means of supply practicable without the construction of expensive works. Such works should be undertaken by the government, and representatives and senators from many of the western states have tried for a number of years to secure the enactment of a law which would enable the government to undertake this work. Such a law was passed by the fifty-seventh congress. The following are its leading provisions:

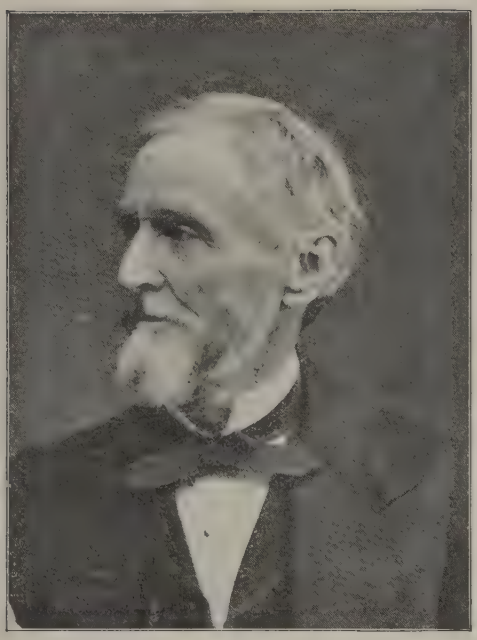
The bill creates a reclamation fund from the sale of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington and Wyoming. After deducting from this fund the amount paid to local land officers and the 5 per cent due the states under the existing laws for educational purposes, the remainder is to be used for the construction and maintenance of irrigation works in these states and territories. If any deficiencies are created in the allowances to agricultural colleges, they are to be made up by direct payments from the Treasury Department. The construction of irrigation works, together with surveys and examinations for the same, is to be under direction of the Secretary of the Interior.

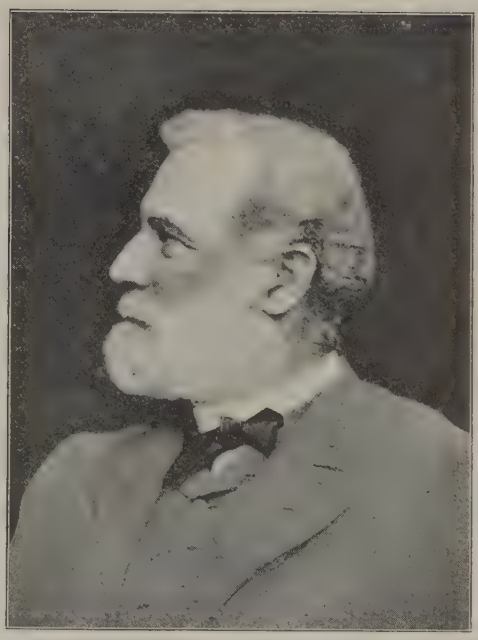
Two other branches of the national government are lending their aid in extending and perfecting the work. These are the geological survey and the agricultural experiment stations. The geological survey deals with the water supply, determining as far as possible the amount of water available, and advising as to the construction of work for putting the water into use. The agricultural experiment stations study the practical phases of the problem from the farmer's view point, such as the amount of water necessary to irrigate an acre of land; the time when the water is needed, and the different methods of its application. Many difficult and delicate problems are confronted in the work in which these stations are engaged in the arid states.

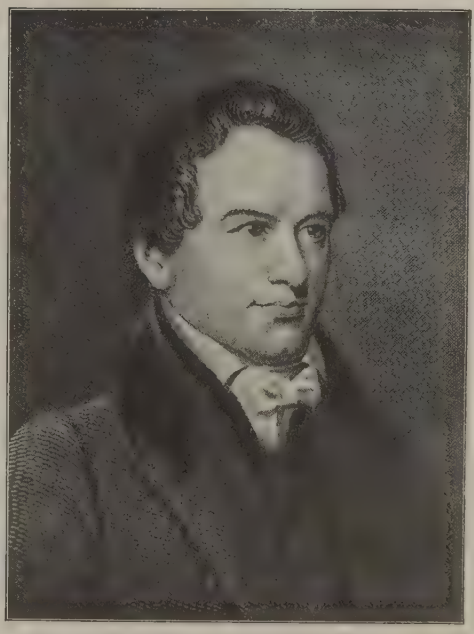
About one-half the water taken through canals is lost by seepage and evaporation. This has two undesirable effects: it lessens the amount of land that can be successfully irrigated, and occasionally produces marshes in lower levels, thus rendering the land of those areas useless. Another serious difficulty in some localities is that arising from the amount of alkali brought to the soil by the water. Sometimes the soil contains the alkali, and it is dissolved by the water. Its effect upon young plants is injurious; but when the roots become well developed the plants thrive.

The legal questions arising from irrigation are often quite complicated. In general the oldest settlers in an irrigated basin have priority of claim to the water, and settlers in the upper part of a valley also have the first right to use of the water unless older settlers have constructed irrigation works in the lower part of the valley before the upper part was settled. In most of the states where irrigation is practiced, laws have been enacted for the adjustment of these claims, and also regulating the quantity of water to which each landholder is entitled. A state commissioner is placed in charge, and by deputies gives careful supervision to each irrigated district.

Irving, HENRY (originally John Henry Brodribb) (1838–), an English actor. He was for a time a clerk in London, but adopted the theatrical profession, his first appearance being at Sunderland in 1856. After playing for nearly three years in Edinburgh he appeared at the Princess's Theater, London, in 1859. After a short stay here, and a few months in Glasgow, he went to Manchester, where he remained for five or six years. Having returned to London in 1866, he took part in the *Belle's Stratagem*, *Hunted Down*, *Uncle Dick's Darling*, etc.; but his first marked success was as Digby Grant in Albery's *Two Roses* (in 1870), which was followed by his powerful impersonation of Mathias in *The Bells* (founded on Erckmann-Chatrian's *Polish Jew*). His next noteworthy parts were Charles I, Eugene Aram, and Richelieu, in the plays so named. In 1874 at the Lyceum Theatre, he sustained the part of Hamlet so successfully as to raise himself to







STATESMEN AND GENERALS

Jefferson Davis
Stonewall Jackson

Robert E. Lee
Robert Y Hayne

Plate 20, Vol. III

the first place among English actors. His chief Shakespearian parts subsequently played are Macbeth, Othello, and Richard III. In 1878 he leased the Lyceum Theater for himself, and has since put on the stage in excellent style *Othello*, *The Merchant of Venice*, *Much Ado about Nothing*, *Romeo and Juliet*, *Twelfth Night*, *Faust*, *Macbeth*, etc., playing in them the principal character along with Miss Ellen Terry. His appearances in the provinces have been equally successful with those in London, and he has met with equal favor in his repeated visits to the U. S. He has contributed a few papers to the magazines on subjects connected with his art, and has delivered addresses at Oxford and Harvard Universities. In 1894 he was knighted. Pl. 6, Vol. I.

Irving, WASHINGTON (1783–1859), a famous author. He was educated for the legal profession, but his tastes were in the direction of literature, and already in 1802 his *Letters of Jonathan Oldstyle* appeared in the New York *Morning Chronicle*. Shortly afterward, being threatened with pulmonary disease, he sailed for Europe, visited most continental countries, and did not return to America until March, 1806. In the same year he was called to the New York bar. His pen was now very busy, and his sketches of Dutch character, in his *Knickerbocker's History of New York*, which made its appearance in December, 1809, proved him possessed of quaint and genial humor to a high degree. About this time he joined his two brothers as a sleeping partner in a mercantile venture, and in 1815 he visited England. The failure of his brothers' business made him resolve to follow literature as a profession, and he settled in London. A series of papers which he now wrote, entitled *The Sketchbook*, first published at New York, 1818, met with such success that an enlarged edition was published in London two years later. For seventeen years, until 1832, Irving resided in Europe, principally in England, France, and Spain. This was a period of great literary activity, and brought forth some of his most famous works, such as *Bracebridge Hall*, the *Tales of a Traveler*, and the *Life of Columbus*. He also acted for a time as secretary to the American embassy in London, and the University of Oxford honored him in 1831 with the degree of D. C. L. Having returned to New York in the spring of 1832, he accompanied the expedition for the removal of the Indian tribes beyond the Mississippi, and collected the material for his *Tour on the Prairies*, published in 1835. From 1842 to 1846 he acted as U. S. ambassador at Madrid, and on his return in that year he retired to his country seat at Sunnyside. His biography of *Oliver Goldsmith*, *Mahomet and His Successors*, and the *Life of Washington* (1855–56) occupied his last years. Other works of his are: *The Conquest of Granada*, *Tales of the Alhambra*, *Legends of the Conquest of Spain*, *Voyages of the Companions of Columbus*, *Adventures of Captain Bonneville and Astoria*. *Rip Van Winkle* appears in the *Sketchbook*. Pl. 11, Vol. II.

Isaac (Heb. "he will laugh"), one of the Hebrew patriarchs, the son of Abraham by Sarah, so called to denote the *laughter* and *gladness* occasioned by his birth. He is remarkable as the offspring of very old age, Sarah being ninety and Abraham a hundred years old at the time of his birth; for his miraculous escape from death as a burnt offering; and for the fraud perpetrated upon him, at his wife Rebecca's instigation, by his son Jacob, to the injury of Esau. He d. at Hebron 180 years old, and was buried in the cave of Machpelah, the resting place of Sarah and Abraham, and of Rebecca.

Isabella of Castile (1451–1504), daughter of King John II of Castile and Leon, consort of Ferdinand the Catholic. She was a woman of great charms, courage, and sagacity, and contributed no small share to the many remarkable events of the reign of Ferdinand V, including the introduction of the Inquisition, 1480, the discovery of America by Columbus, 1492, and the final expulsion of the Moors after the conquest of Granada.

Isabella II (1830-1904), ex-queen of Spain, daughter of Ferdinand III, succeeded her father three years after, her mother being appointed queen regent. The early years of her reign were disturbed by a rising in favor of her uncle, Don Carlos, who, if the Salic law had not been set aside, would have ascended the throne instead of her; but this was finally quelled in 1839. She was declared of age in 1843, and in 1846 was married to her cousin, Don Francisco d'Assisi. Her reign was so despotic that a revolution took place in 1868, which drove her from the country. She resigned her claims to the crown in favor of her son Alfonso, who ascended the throne in 1875. She lived sometimes in Spain, sometimes in Paris, where she died Apr. 9, 1904.

Isaiah (Heb. *Yeshayahu*, Salvation of Jehovah), the first of the great Hebrew prophets. He began his predictions in the last year of Uzziah's reign. Of his father, Amoz, we know nothing, and of the circumstances of his life but little. We know, however, that he had great influence over the kings and people of Judah, and he is supposed to have died at a good old age at Jerusalem, at the beginning of Manasseh's reign. The first portion of the writings that pass under his name consists chiefly of declarations of sins and threatenings of judgments, while the last twenty-seven chapters, together with some previous ones, hold out promises of a glorious future for Israel.

Ischia (is'ki-à), an island of Italy, 26 sq. mi. in extent, in the Gulf of Naples, with beautiful scenery and a fertile soil, producing excellent wine and fruits. It is entirely volcanic in character, and is noted for its warm mineral springs and volcanic convulsions. The capital, Ischia, with some 7,000 inhabitants, is a favorite resort of tourists in Italy. Other towns are Casamicciola and Forio, both of which suffered severely in 1883. Pop. 30,000.

Isère, a department of Southeastern France; area 3,185 sq. mi. The soil is generally fertile, and produces abundant cereal and legu-

minous crops; the vine and mulberry being also cultivated. Lead, copper, and iron are found in considerable quantities; also coal, marble, slate, granite, and prophyry, and the iron mines employ a number of blast furnaces. There are numerous paper, silk, and cotton mills. Grenoble is the capital. Pop. 584,274.

Ishmael (Hebrew, *Yishmael*, whom God hears), the son of Abraham by Hagar. He married an Egyptian wife, and had twelve sons and one daughter, who became the wife of Esau. His descendants are Ishmaelites.

Ishpeming, Marquette co., Mich.; on the C. & N. W., D. S. S. & A. and L. S. & I. railroads; 15 m. w. s. w. of Marquette. It is the center of the great Lake Superior iron-ore region, and is on the Marquette range, the most productive of the four iron ranges. In 1891, the mines of the Ishpeming district had an ontput of 1,360,000 gross tons. Gold and silver were discovered in 1877. In 1884, the first stamp-mill was erected; in 1889, there were 45 in operation. Marble is quarried near the city. There are several foundries, blast-furnaces and machine shops. Pop. 1900, 13,255.

Isinglass, a gelatinous substance, of which the best kind is prepared from the swimming-bladder or sound of the sturgeon dried and cut into fine shreds, while the American article is obtained from the same part in the cod, hake, etc. It is the basis of the Russian glue, which is preferred to all other kinds for strength. Isinglass boiled in milk forms a nutritious jelly, and a solution in water, with a very small proportion of some balsam, spread on black silk, is the court plaster of the shops. It is also used in fining sherries and other white wines, and in making mock pearls, stiffening linens, silks, gauzes, etc. With brandy it forms a cement for porcelain and glass.

Isis, the principal goddess of the Egyptians, the sister and wife of Osiris, representing the moon, as Osiris did the sun. The Egyptians believed that Isis first taught them agriculture, and as the Greeks offered the first ears gathered to Ceres, so did the Egyptians to Isis. She is represented under various forms. In one representation she has the form of a woman, with the horns of a cow, as the cow was sacred to her. She is also known by the attributes of the *lotus* on her head, and the *sistrum* in her hand, a musical instrument which the Egyptians used in the worship of the gods. She is often accompanied by her infant son Horus. In one celebrated Egyptian statue she was shown with her face veiled. She was particularly worshiped in Memphis, but at a later period throughout all Egypt. From Egypt her worship passed over to Greece and Rome, and the abuses which it occasioned at Rome caused its frequent prohibition there. It was, however, repeatedly revived. The Romans never considered the worship, which was introduced among them by Sulla (B.C. 86), altogether reputable, and its attendant immorality was vigorously lashed in the satire of Juvenal.

Isla de Pinos ("Isle of Pines,") an island lying s. of the western portion of Cuba, to which it belongs, 40 mi. by 34, with good pastures and valuable timber.

Islam (is-läm'), that is, complete resignation and submission to the will of God, is the name given in Arabic to the religion originated by Mohammed. The fundamental doctrine of Islamism, and the only one it is necessary to profess to be a Moslem, is expressed in the common formula of faith: "There is no God but Allah, and Mohammed is his prophet," to which the Shiahs or Shiites, that is, the majority of Persian and Indian Moslems, add "and Ali is the vicar of God."

Island, a portion of land entirely surrounded by water, and smaller in size than the great masses of land known as continents. Islands are of all sizes, from mere dots of land or rock in the sea to a great mass like Australia, which is often spoken of as a continent. Islands are divided into two distinct classes: *continental* islands, lying in proximity to continents, and *pelagic* or *oceanic*, from their position in the oceans. Continental islands occur along the margin of the continents, and are generally of the same geological structure. Pelagic islands are mostly of volcanic or coral formation. A cluster of islands, such as the West Indies, the Canaries, the Hebrides, etc., are called an *archipelago.*

Islands of the Blessed, according to the Grecian mythology, islands which were supposed to lie westward in the ocean, where the favorites of Zeus, snatched from death, lived in perpetual happiness.

Isle of Pines, a small island in the Pacific, southeast of New Caledonia, and forming a dependency of it.

Islington, a district in the north of London, since 1885 a parl. borough returning four members. Pop. 1891, 319,433.

Ismail (is'mä-il), a town in the south of Russia, gov. of Bessarabia, 35 mi. e. of the Roumanian port Galatz. It is an important market for wool, hides and leather, corn, and tallow. Pop. 28,000.

Isoch'ronism (Gr. *isos*, equal, *chronos*, time), the property by which a pendulum, or a balance wheel, or an oscillating particle (as of air) conveying sound vibrates through longer or shorter arcs in the same time (or nearly so). Given a certain length of spring, all the vibrations, large or small, are isochronous. If the spring is shortened, the large vibrations take place quicker than the short ones; if, on the contrary, the spring is lengthened, the small arcs are performed quicker than the large ones. For small oscillations a pendulum is almost exactly isochronous, but it is only with the cycloidal pendulum that perfect isochronism is obtained.

Isoc'rates (B. C. 436–338), an ancient Greek orator, b. at Athens. He spoke seldom in public; but he prepared orations for others, and trained many able orators, among his pupils being Isæus, Hyperides, Lycurgus, etc. His patriotism was sincere, and his desire for the freedom of Greece so intense, that he starved himself to death in his ninety-eighth year from grief at the unhappy battle of Cheronæa. He

was master of a graceful literary prose style, but was accused of being too florid and of carrying elaboration too far, his periods being formed with endless labor. Twenty-one of his orations are still extant.

Isother'mal Lines, lines drawn on a map or globe through places which have the same mean annual temperature. *Isotheral* lines are drawn through places having the same mean temperature during the hottest month of the year. *Isocheimenal* or *Isocheimal* lines are drawn through places having the same mean temperature during the coldest month in the year.

Ispahan (is-pȧ-hän') (or Isfahan), a very ancient city of Persia, and for centuries its capital, in the province of Irak-Ajemi, on the river Zendarud, 210 mi. s. of Teheran, the present Persian capital. It was once one of the most important and magnificent cities in the East, but little is now left of its former splendor, the largest part of the city being in ruins. The manufactures are still extensive, however, including trinkets, firearms, sword blades, glass, earthenware, artistic brasswork, woolens, cottons, velvet, and satin. Much opium is grown in the neighborhood, as also tobacco, madder, etc., forming important articles of trade. Ispahan is the emporium of the inland commerce of Persia. Pop. 90,000.

Issue, in law, the point or matter depending in a suit on which two parties join and put their cause to trial. It is a single, definite, and material point issuing out of the allegations of the parties, and consisting regularly of an affirmative and negative. It is either an *issue in law* to be determined by the court, or *in fact*, to be ascertained by a jury.

Isthmian Games, public games of ancient Greece, so called because they were celebrated on the Isthmus of Corinth, and having a similar character to the Olympian, Nemean, and Pythian games. The Greeks in general took part in them, and the principal exercises were boxing, wrestling, foot, horse, and chariot races, and throwing the discus. They were celebrated in April and May, in the first and third year of each Olympiad, and the victors were rewarded with wreaths of pine leaves. The origin of these games was lost in antiquity, but they were generally regarded as originated in honor of Poseidōn (Neptune).

Isthmus, in geography, a neck of land by which two continents are connected, or a peninsula is united to the mainland. Such are the *Isthmus* of Panama, connecting North and South America; the *Isthmus* of Corinth, connecting the Morea with Northern Greece.

Is'tria, a peninsula of triangular form, projecting into the n.e. corner of the Adriatic Sea, part of the Austro-Hungarian dominions. The surface is mountainous, particularly in the north. The soil is generally thin and gravelly; but the forests, which are extensive, yield excellent timber, and the vine, olive, and mulberry are successfully cultivated. Area 1,900 sq. mi. Pop. 292,006.

Italy, a kingdom of Southern Europe, comprising the boot-shaped Italian peninsula and the islands of Sicily and Sardinia; area, 110,623 sq. mi.; pop. (1901) 32,449,754. In point of geography and population alone has Italy been a unit until recent years, its political unity having been effected in 1870. During the earlier Middle Ages Italy was, nominally at least, under the rule of the German emperors. It was divided into a number of independent commonwealths, some republican, others monarchial, which constantly varied in territory and character. Among them were the famous cities whose glories are recorded in history and romance. By the beginning of the fourteenth century German dominion was completely overthrown in Italy. For two centuries Northern Italy was ruled by independent states, while the southern part was under French supremacy. Early in the sixteenth century France and Austria contended for dominion in Italy, and in 1525 the French were finally overcome. During this and the following century most of the smaller states lost their independence and became subject to the ruling dynasties of Lorraine, Bourbon and Savoy. During the period of the Napoleonic wars French supremacy was restored. With the aid of Austria the French were expelled in 1814. The Congress of Vienna (1815) divided Italy into the kingdoms of Sardinia and the Two Sicilies, the grand-duchy of Tuscany, the duchies of Parma, Lucca and Modena, the Lombardo-Venetian kingdom (united with Austria), the republic of San Marino and the principality of Monaco, and the states of the church. In 1859–60 the Two Sicilies, Lombardy and a part of the Papal States, together with the duchies which had retained their independence, were annexed to the kingdom of Sardinia, the ruler of the latter assuming the title of King of Italy. Venetia was added in 1866, the remainder of the Papal States in 1870. The government is a constitutional monarchy, the crown being hereditary in the house of Savoy. It is based on the statute of the kingdom of Sardinia, 1848, with modifications relating especially to the separation of church and state and the abolition of privileges formerly enjoyed by the Church of Rome. The capital of Italy has been Rome since 1870. The king shares the legislative power, with a senate and a chamber of deputies. The former is composed of the princes of the royal family and an unlimited number of persons appointed by the king for life. No member is under 40 years of age. The Senate includes only certain classes of citizens, such as bishops, former deputies, high officers of state or of the army, persons distinguished in science or otherwise, or such as have for three successive years paid 3,000 lire of personal taxes. The Chamber of Deputies is elected by all citizens over 25 years of age who pay a certain amount of rent or taxes, also state officers and professional men. No election is valid unless at least one third of the inscribed vote be cast. There are 508 deputies, each being elected for five years. Local government is administered by provincial councils, elected by the communes. Liability to mili-

tary service is almost universal. The standing army numbers about 275,000 men. The finances of the kingdom have been embarrassed from the beginning, the annual deficit being very large. The public debt in 1901 was over $2,853,000,000. No state religion is recognized, but the large proportion (99 per cent.) of the population is Roman Catholic. The pope has extensive privileges and prerogatives, though no longer any temporal authority.

The higher educational institutions of Italy are numerous and include 21 universities, some famed for age and standing. Most noted are those of Naples, Rome, Turin, Pavia, Padua, and Pisa. Among the mass of the Italian people deplorable illiteracy prevails, not all even of the better class being able to read and write. The government has begun extensive reforms in this direction. Italy has long been famed for the study of music and the fine arts. In commerce and productive industry Italy has fallen far behind her former place among the nations of Europe. The principal products are corn, wine, raw silk, rice, olives, hemp, flax, and cotton. The cultivation of the mulberry tree and raising of the silkworm is an extensive industry of Northern Italy. In the south the cotton plant and the sugar cane are raised. Semi-tropical fruits abound. The soil is naturally fertile and agriculture is extensively carried on, recently with improved methods. The wines of Southern Italy are of excellent quality, but those of the north are characterized by a peculiar acid flavor. Mineral deposits are rich and varied; most important are sulphur, silver, lead, copper, and iron. Especially famous are the marbles of Carrara. Italy has only two important navigable rivers, the Po and the Adige. Northern Italy is intersected by an elaborate system of canals, for purposes of commerce and irrigation, Piedmont alone containing 250. These canals date back to an early period, and have greatly benefited agriculture. Italy is traversed by the mountain systems of the Alps and Apennines. The tunnels through Mont Cenis and St. Gotthard connect the country by railway with France and Switzerland. Besides the mountain scenery, Northern Italy is famed for its beautiful lakes, chief of which are Como, 35 mi. long, Maggiore, 40 mi. long and 2,500 ft. deep, and Garda, 33 mi. long. The climate of Italy is considered delightful, but the percentage of mortality is the highest in Europe. It varies from a temperate heat, with moderately severe winters in the north to a temperature of tropical intensity on the plains of the south, which are subject to drought and the dreaded *sirocco*. This region has been visited by destructive earthquakes and volcanic eruptions, notably from Mt. Vesuvius and Mt. Etna, in Sicily. Along the coasts are vast lagoons and marshes, from which arise unwholesome miasmatic gases. Wild animals are scarce in Italy; the various domestic animals are raised, but not in improved breeds. Animal food is less largely used than in the more northern parts of Europe. Fish are caught in large numbers on the coast, and their export constitutes an important industry. The largest city is Naples, 563,751. Rome has 463,000, Milan 493,956. Other large cities are Turin, Palermo, Genoa, and Florence.

History.—The ancient history of Italy belongs properly under that of Rome. Before the period of Roman supremacy the country was peopled by various Italic tribes, among whom were the Etruscans, or Tuscans, Umbrians, Oscans, Sabines and Latins. The last named became supreme, and gave their name to the ancient race and language. The southern part was occupied by Greek colonies, and was called Magna Græcia. The modern population has the characteristics of the Romans and the Gauls (Celts), in the north mingled with the Germanic element, and but few traces of the aboriginal tribes remain. With the fall of Rome, 476 A. D., begins the history of Italy proper. The invading barbarians, the Heruli, proclaimed their leader, Odoacer, king of Italy, but in 493 they were overthrown by Theodoric the Great, king of the Ostrogoths. He united the whole peninsula under Gothic rule, and proved himself a wise and benevolent king. Italy had not seen such prosperity since the earlier glory of the Roman state. In 552 the Ostrogoths were vanquished by the armies of the Eastern Emperor Justinian under the famous general Belisarius, and Italy became an exarchate of the government at Constantinople, where the Roman Empire in the East had been established in 395. To avenge his disgrace, Narses, the first governor, invited the Lombards, a Germanic tribe, to invade Italy, 568. They introduced Germanic feudal institutions, and greatly modified the political and social life of the country. Venice, which had been founded by fugitives during the invasions of the fifth century, and Rome, with some other districts, maintained their independence, after being for a time the nominal vassals of the Eastern Empire. The Lombards having threatened Rome were defeated by Pepin, king of the Franks, whose aid had been asked by the pope (754). Certain territory was given to the pope, and the gift was confirmed by Pepin's son, Charlemagne, who conquered the Lombards and annexed their country to the Frankish kingdom (774).

In 800 Charlemagne was crowned Roman emperor by the pope, and the bestowal of this title led to the territorial conquests and claims of the German emperors in Italy during the following centuries. By the Treaty of Verdun (843) Italy fell to Lothar. See *Germany*. In 888 the Carolingian dynasty ended, and Berengarius I became king of Italy. In 951 Otto, king of Germany, reduced Berengarius II to vassalage, and in 961 himself assumed the crown. The Saracens conquered Sicily, 827, and in 842 invaded Southern Italy, conquering many places on the coast, which they held until driven out by the Normans, 1016. The foreign rulers were never acceptable to the Italians, and from the beginning of the eleventh century their hatred, fanned by the papal clergy,

whose power had been curtailed by the German emperors, showed itself in frequent revolts. The German rulers maintained their authority with difficulty, but the great Henry III (1039–56) succeeded in gaining control of the Papal See, after deposing three popes one after another, and thus temporarily stifling revolt. Henry IV, however, was compelled to submit most humbly to Pope Gregory VII, the famous Hildebrand, at Canossa (1077). The popes were supported by the Normans, whose realm in Southern Italy had been consolidated by Robert Guiscard (1057–85) and the two Rogers (1085–1154). The Lombard kingdom gradually resolved itself into flourishing municipalities, such as Milan, Genoa, Pisa, and Venice, powerful enough to withstand even the mighty Hohenstaufen emperors. During the 60 years of interregnum from foreign rule, there arose the famous factions of the Guelphs, the national party, and the Ghibellines, the supporters of the emperors. See *Guelphs*. The former were victorious, and the Emperor Frederick I (Barbarossa) was compelled to relinquish all rights in the cities of the Lombard League (1183). By the marriage of his son to the daughter of the last Norman king, the Kingdom of the Two Sicilies, which included Southern Italy and the adjacent island, was acquired. The splendid prosperity which now prevailed in Italy was marred by the inveterate and destructive feuds of the factions. Internal rivalry, intolerance, and dissension gradually weakened the power of the cities, and their arbitrary attempts to secure supremacy contributed largely to their ultimate destruction. So the war between Genoa and Pisa resulted in the humiliation and final decline of the latter state. In 1254 the German dynasty was completely overthrown, and the Kingdom of the Two Sicilies was secured by Charles of Anjou. The Guelphs continued victorious, and defeated the party of the aristocracy in Venice, Genoa, and Florence. From the last city all noblemen were banished (1282). The attempt of Henry VII to restore German supremacy in Italy was defeated by the Guelphs (1312); but the popular party was torn by factional disputes and gradually succumbed to petty tyrants. Most important of the oligarchic republics was Venice (1311). In Rome the democratic party under Rienzi, "the last of the tribunes," was successful for a short time (1347). Lower Italy had been consolidated under the kingdom of Naples and enjoyed comparative peace. Charles of Anjou had lost Sicily in 1282, at the memorable popular uprising against the French known as "the Sicilian Vespers." In 1347 a terrible famine and the most destructive plague in history visited Italy, which is estimated to have reduced the population more than one half. Yet it was at this very time that literature, science, and the fine arts reached their highest perfection in this country.

From the middle of the fourteenth century to the end of the fifteenth the history of Italy as a whole ceases, and we have the annals of the several powerful cities and the famous families

who ruled them. The five commonwealths most prominent were Naples, Milan, Florence, Venice, and the Papal States. The smaller states dwindled to insignificance. In Milan the Visconti family and later the Sforza overawed neighboring princes and gradually subjected Lombardy to their rule. In Florence the famous Medici family by wealth and prudence rose to almost royal power. Venice under the celebrated "doges" conquered several cities, established colonies in the Grecian Archipelago and on the shores of the Black Sea. In contests with the Turks and with Naples she was victorious. During the early sixteenth century Italy was the scene of desolating struggles between France and the German emperors, now represented by the Austrian House of Hapsburg. They began in 1494 with the attempt of Charles VIII of France to conquer Naples. The battle of Pavia (1525) decided the struggle finally for the German emperors, who thereafter appointed rulers over the several states. Italy enjoyed comparative peace for 150 years, during which much progress toward national consolidation was made. The Medici became hereditary rulers in Florence, and when the family finally became extinct in Tuscany (1737), the succession passed to the duke of Lorraine, husband of the Austrian empress, Maria Theresa. Charles V secured Milan and Naples to Spain, but between 1706 and 1713 (Peace of Utrecht) Austria acquired both, together with Sardinia, later exchanged for Sicily. Piedmont had been obtained by the ducal house of Savoy. The condition of Italy, nationally, was one of apathy and decay, down to the French Revolution. Savoy was invaded by a French army in 1792 and in 1796 was annexed to France. In 1793 Italy attempted to join the coalition against France, and as a result was reduced to the condition of a dependency by that country. By the treaty of Campo Formio (1797) Napoleon surrendered Venice to Austria, and transformed the remainder of Italy into "republics." These were the Cisalpine, the Ligurian (Genoa), the Roman (Papal States), and the next year (1799) Ferdinand IV was expelled from Naples and his kingdom formed into the Parthenopean Republic. While Napoleon was in Egypt the Austrians and Russians reconquered Upper Italy, and the British, Russians, and Turks Lower Italy, but on his return French supremacy was quickly restored (1800). The Cisalpine Republic became the Italian, with Bonaparte as president (1802), and later the kingdom of Italy, administered by his stepson (1805). Various districts were annexed to this kingdom. In 1806 Naples was made a kingdom for Joseph Bonaparte, who was succeeded by Murat (1808). The same year Etruria and the Papal States were added to France. From 1809 till 1814 Napoleon's supremacy in Italy was undisturbed. Murat joined Austria in the rising against Napoleon, but was afterward dethroned by a counter-revolutionary movement and sentenced to death by court martial.

The Congress of Vienna (1815) reconstituted

Italy as follows: The kingdom of Sardinia was restored to the House of Savoy, and to it were added all the provinces of the Genoese Republic; it was thereafter sometimes called the kingdom of Piedmont; several of the smaller principalities were restored to the Hapsburg-Este family; Maria Louisa, wife of Napoleon, received Parma, and the Duke of Parma was given Lucca; Tuscany reverted to the Austro-Lorraine dynasty, the Papal States to the pope, Naples to the Bourbons; San Marino and Monaco remained independent. The wishes of the Italian people for unity and independence were hopelessly crushed by the restoration of the Austrian and the papal power, and conspiracies and secret societies (carbonari) sprang up almost immediately against the hated foreign rulers. Outbreaks in Piedmont and Naples (1820–21) secured promises of reform, but vigorous measures of oppression were adopted and carried out with bloody zeal by the Austrian armies. In 1831 Charles Albert came to the throne of Piedmont, and by his somewhat liberal concessions laid the foundation for the ultimate union of Italy under his house. Joseph Mazzini made vigorous pleas for national unity, calling upon Charles Albert to serve his country as its liberator. Pius IX, who became pope in 1846, introduced reforms which were also adopted by Piedmont and Tuscany. A customs union was effected among these three states. Naples refused reforms, and in January, 1848, a revolution broke out in Sicily and Milan. The feeling was increased by the Feb. Revolution in France, and Rome, Naples, and Piedmont were forced to grant constitutional rights. In Milan the people rose against Austrian rule, and March 24 the 70,000 foreign troops under Rádetsky were compelled to retreat. Charles Albert now entered Lombardy at the head of the united Italian armies, the champion of national independence and extermination of Austrian rule. The pope at first supported the movement, but his subsequent change of position greatly weakened the national cause and fighting force. The revolution progressed for a time, even after Rádetsky had won two brilliant victories, but in March, 1849, Charles Albert was utterly routed at Novara, and the struggle was ended. In November, 1849, the pope had fled from Rome and a republic was proclaimed, with Mazzini as president; he was restored to his possessions by a French army of occupation (1850). Merciless reaction and crushing tyranny under the Austrian troops followed throughout Italy, except in Piedmont, whose new king Victor Emmanuel II (1849–78) continued the liberal reforms begun in that state. Austria made some ineffectual attempts to conciliate Lombardy and Venetia by improving their railroad and postal facilities and modifying the tariff. Cavour, the prime minister of the kingdom of Sardinia, made fruitless efforts to secure the withdrawal of French and Austrian troops from Rome (1856). Toward the close of 1858 it became evident that Sardinia and France, with possibly Russia, were preparing to ally themselves against Austria. Early in 1859 Victor Emmanuel proclaimed his intention to aid in freeing Italy from the Austrian yoke. War began in April, 1859; after a few smaller engagements, the Austrians were routed in the great battle of Magenta, June 4, and compelled to relinquish Milan and northwestern Lombardy. They were again defeated at Solferino (June 24), after which the French emperor, uncertain as to future success and fearing the interference of Prussia, suddenly concluded the peace of Villafranca. This proposed a confederation of the Italian states, with the pope as honorary president, but was rejected by all Italy.

Early in 1860 the states whose sovereigns had fled declared for annexation to the kingdom of Sardinia. Victor Emmanuel was proclaimed king of Italy, March 17, amid great rejoicings. Savoy and Nice were ceded to France to indemnify her for the expenses of the war. In May began the swift and famous conquest of the Two Sicilies by Garibaldi (which see), and in November Victor Emmanuel formally annexed the provinces which had composed this kingdom. Cavour d. June, 1861, and was after a short interval succeeded by Ratazzi, who was subservient to the French Empire. In July, 1862, the Liberals, whose leader was Garibaldi, denounced the French occupation of Rome. Volunteers were hastening to join him in proceeding against Rome, when a royal proclamation accused them of rebellion against their sovereign, despite Garibaldi's assurance of unshaken loyalty. For the account of the subsequent troubles in Sicily and the final surrender of the wounded leader, see *Garibaldi.* The national party was greatly displeased with the conduct of affairs, and the ministry was compelled to resign. In the War of 1866, Italy was the ally of Prussia, and after the decisive defeat of Austria at Sadowa, Venetia was annexed to the kingdom of Italy by treaty. The capital was at Turin, 1859–65, when it was transferred to Florence. In 1864 France agreed to withdraw her troops from Rome, and had for the most part done so when, in 1867, Italian volunteers under Garibaldi attacked Rome. France now encouraged the pope to raise an army for the defense of Rome, and soldiers were recruited there and in nearly every Catholic country, including even Lower Canada. The government tried to suppress the disturbance, but the national feeling that Rome should be the capital of the kingdom of Italy was very strong. Trouble continued until, after the withdrawal of the last French troops from the pontifical territory owing to the war with Prussia, the king in September, 1870, announced to the pope that the occupation of Rome by government troops was imperative for the public peace, and on the 12th they entered. The final consolidation of the kingdom of Italy, with its present limits, was effected Oct. 2, 1870, the whole of the Papal States was absorbed, and Rome became the recognized capital, although the entry of Victor Emmanuel did not take place until July 2, 1871. By the "bill of the papal

guarantees" the relations of church and state were defined, the Vatican and its dependencies were secured to the pope, together with a yearly donation of $622,500. In January, 1878, Humbert, son of Victor Emmanuel and grandson of Charles Albert, succeeded to the throne, and is the present monarch (1897). Affairs in Italy have been generally quiet since 1871, the embarrassing financial condition being the principal cause of dissatisfaction. A destructive eruption of Vesuvius occurred in 1872. In 1883 Italy became a member of the Triple Alliance, with Germany and Austria. Serious disturbances in Sicily occurred in 1893 owing to the financial condition and tariff war with France. In 1894 the famous bank scandals attracted attention owing to the government's part in concealing them. The foreign possessions in Africa form the colony of Eritrea on the coast of the Red Sea; it covers 955,000 (?) sq. mi. and has pop. of 450,000. Italy claimed a protectorate over Abyssinia, and a treaty of "mutual protection" was made in 1889, but abrogated by King Menelek in 1893, leading to a war. King Humbert was assassinated by an anarchist named Bresci at Monza, July 29, 1900. His son, Victor Emanuel succeeded him. Bresci was sentenced to imprisonment for life.

Language.—The Italian language is descended from the Latin through the intermediate stage of the so-called "rustic Latin." This is the name given to the corrupt dialects of the uneducated which arose after the Fall of Rome and the consequent disuse of the language as a standard of literature. The dialects had existed before, but only became predominant under favoring circumstances. From the same parent sprang Spanish and French, but contributing elements have tended to remove them somewhat further from the original. The Italian was first rescued from its state of decay through the patronage of the Hohenstaufen emperor, Frederick II (1212–1250), who made it the language of his court in Sicily. This ruler established the University of Naples. In the twelfth and thirteenth centuries the poets, especially those of Tuscany, employed Italian, the natural result being that their dialect took precedence over the others in beauty and accuracy and has retained it until the present. Dante (1265–1321) did much to arrange and consolidate the various elements, and thus long before most other European languages had reached their full development, Italian received substantially the form it has to-day. In the fourteenth century the language was further perfected by Petrarch and Boccaccio, and in the late fifteenth and early sixteenth prose form became fixed and elaborated in the works of Leonardo da Vinci and Machiavelli, "the father of Italian prose." Italy has now a uniform written language, but the spoken dialects differ widely, sometimes as much as utterly different tongues. The standard aimed at by educated Italians is a combination of the pure Tuscan dialect with the pronunciation of Rome. The broad vowels and the vast preponderance of vowel-ending give the Italian a particularly musical character. This makes it well adapted for singing, but in euphony of speech Spanish surpasses it in some respects. The poetic idiom, in choice of words and pronunciation, differs more widely from the prose than that of any other European language. The vocabulary is rich in poetic words and in such as were received from classical sources, but in the expression of material things in modern life is singularly poor. A few characteristics of pronunciation are the following: *c* before *e* and *i* is pronounced *ch* as in *Medici*, while *ch* before *e* and *i* has sound of *k; sc* before *e* and *i* = Eng. *sh; g.* in *gh* is hard, while before *l* it equals Fr. *ll*, so Azeglio (Azellyo); *i* in *ti* and *si* retains its distinct sound.

Literature.—In a bare outline of Italian literature it is possible to mention only the great authors whose fame has spread beyond the limits of their native land and given them a place in the history of the world literature. As the earliest Italian poet worthy the name, may be mentioned Pier delle Vigne, secretary of Frederick II, the author of odes and canzones. Fra Guittone, besides sonnets and odes, was the author of 40 letters in prose, valuable as the earliest specimen of this class of composition. Brunetto Latini (1260) was the tutor of Dante, who introduces him in the *Inferno*, and a man of wide learning. His works *Il Tesoro* and *Il Tesoretto* contain a curious collection of varied knowledge and moral precepts. The historical chronicles of Matteo Spinola (1247–68) are the oldest monument of Italian prose literature, Latin having previously been the language of serious composition. The *Divina Commedia* of Dante (1265–1321) was the earliest great classic of Italian literature and has remained the greatest, being justly accorded a place among the few world epics. D'Ascoli is remembered for his bitter but brilliant critical attack on Dante in *L'Acerba*. Francesco Petrarca (1304–74) was the first writer of Italian lyrical poetry, and is remembered as the creator of the sonnet. His compositions are marked by a simple elegance which has never been surpassed. The English poet Chaucer and late Sir Philip Sidney were indebted to him for metrical form. Besides Petrarch's sonnets, addressed to *Laura*, and his allegorical poems *Triorfi* he wrote orations, letters, and Latin philosophical and polemical treatises. Perfect prose form was first attained by "the prince of novelists," Boccaccio (1313–75), whose famous *Decamerone*, or *Ten Days' Entertainment*, was such a mine of wealth for Chaucer and subsequent story-tellers. During the fifteenth century the scholastic writers substituted a corrupt Latin or Greek for the pure native language. The great families of this century, such as the Medici, the Visconti, the Sforzas, were liberal patrons of art and letters, and to Lorenzo de Medici, the "father of letters," is due the grand revival of Italian literature. To this period belongs the first Italian drama, *L'Orfeo* of Poliziano. Most famous of the poets in the later fifteenth century is Matteo Boiardo, author of *Orlando Innamorata*, the model of Ariosto's great work. To this age are

credited valuable historical works in Latin, and the orations of the great political reformer, Savonarola. The collection of libraries and the progress of art and learning generally were greatly encouraged by the foundation of universities and the revival of letters consequent upon the coming to Italy of many Greek scholars after the fall of Constantinople (1453). The effects of the Italian Renaissance reached over the whole civilized world. The sixteenth century is the golden age of Italian letters, as well as of art and science. The greatest poet of the age is Ariosto (1474–1533), whose *Orlando Furioso*, the first great epic of chivalry, was familiar to all classes in Italy, for those who could not read it eagerly memorized portions of it for their enjoyment. The poem celebrates the deeds of the legendary ancestors of the house of Este. The most famous work of Torquato Tasso (1544–95) is *La Gerusalemme Liberata*, translated into every modern language. He is also the author of excellent epistles and philosophical writings. Tasso is the subject of one of Goethe's tragedies. The famous sculptor Michael Angelo wrote sonnets of dignity and beauty. To this period of Italian glory belong the great painters Raphael, Correggio, and Titian. First among the prose writers is Machiavelli, the diplomat and statesman. His chief works are the *Art of War* and *The Prince*. Guicciardini's lengthy *History of Italy* is a model work.

The seventeenth century has many names famous in science, if not in the domain of literature proper. Here above all is the immortal Galileo. Several historians of note wrote in this century; to the preceding belongs the physician and philosopher Cardan (d. 1576). Operatic composition and representation made considerable advance in the seventeenth century. In the eighteenth century a vigorous revival of poetry and letters again appears. Among the names in science may be mentioned Volta, Galvani, and Spallanzani. The chief poets are Maffei and Calsabigi. This century is the golden age of Italian dramatic literature. Metastasio (1698–1782), the master of the pastoral drama, gentle, sweet and flowery in style, is in strong contrast to Vittorio Alfieri (1749–1803), whose tragedies are marked by a bold, vigorous, severely plain classicism. They treat subjects of ancient and modern history, and include the titles: *Polynices*, *Antigone*, *Agamemnon*, *Virginia*, *Philip II*, *Maria Stuart*. They adhere strictly to the dramatic unities. Carlo Goldoni (1707–93) holds a similar place as a reformer of comedy. In the present century the revival of classical form has been ably furthered by Vincenzo Monti (1754–1828), the best translator of the *Iliad* and the *Odyssey*. The poet-patriot Silvio Pellico (1788–1854) wrote his famous romantic tragedy *Francesca da Rimini* prior to his two years' imprisonment in an Austrian dungeon, so simply but charmingly described in his autobiographical work *Le mie Prigioni* (*My Prisons*). Gabriele Rossetti (1783–1854), the exiled poet, whose sons, Dante Gabriel and William M., have achieved fame in English literature, is the ablest commentator on the *Divina Commedia*. Other foremost writers are Battista Niccolini (1782–1861), whose *Arnoldo da Brescia* is the recent Italian drama; Leopbestardi, distinguished as a poet, scholar, and philosopher; Giusti, the author of satirical lyrics. The chief novelists of the century are Manzoni, author of the historical novel *Promessi Sposi* (*The Betrothed Lovers*); Rosini, who wrote *Il Conte Ugolino;* and D'Azeglio, whose patriotic novels have exercised a widespread influence. Of great influence on the Italian youth have also been the political writings of the statesman, Joseph Mazzini.

Itch, a contagious cutaneous disease, appearing in small watery pustules on the skin, accompanied with uneasiness or irritation that inclines the patient to rub or scratch. It is occasioned by a small insect, which burrows within the epidermis; and is cured by a mixture of lard and sulphur, applied externally.

Ito, Herobumi Marquis (1840——), a celebrated Japanese statesman and ex-premier of the empire. He has been the leading spirit in the reforms in Japanese civilization and methods of government. He visited the United States in 1871 to study our system of coinage, and on his return established the Japanese mint. He was minister of public works, in 1873, and prime minister for four terms, the last ending in 1901. He wrote the constitution which gave Japan her present form of government, and was also the leader in the war with China. He visited the United States again in 1901. Of late he has been one of four "Elder Statesmen," advisers to the Mikado, and was a leading figure in the Russo-Japanese war.

Ithaca, now Thiaki, one of the Ionian Islands, on the w. of Greece, between the mainland and Cephalonia, 17 mi. long and not above 4 broad. It is rugged and uneven, and divided into two nearly equal parts, connected by a narrow isthmus. The inhabitants are industrious agriculturists and mariners, and build and fit out a considerable number of vessels. Schliemann has recently made important excavations, and has identified several sites mentioned by Homer. Vathi, the modern capital, trades largely in oil, wine, raisins, and currants. Pop. 6,000; of the island, 11,000.

Ithaca, county seat of Tompkins co., N. Y., 60 m. s. w. of Syracuse; at the s. end of Cayuga Lake, and on the Lackawanna, the Lehigh Valley and other railroads. It is in a rich, agricultural region, has an extensive coal trade and manufactures castings, guns, salt, glass, wall paper, calendar clocks and agricultural implements. Ithaca is one of the most beautiful cities in the state and surrounded by charming scenery. The Ithaca Fall, 150 ft. broad and 160 ft. high, is about a mile distant in Ithaca Gorge, which is said to contain more waterfalls in the space of a mile than any other place in America. Among features of interest in the city, is Cornell University, which was founded in 1865, and at the close of 1902 had 367 instructors and 3,290 students. Its libraries aggregate 250,000 vol-

umes. There are also in the city several well-known preparatory schools, a free public library and Ithaca Conservatory of Music. Ithaca was settled in 1781, and was at various times called "The Flats," "The City" and "Sodom" until 1806, when Simeon DeWitt gave it its present name. Pop. 1900, 13,136.

Iturbide (e-tur'be-da), AGUSTIN DE (1787–1824), Emperor of Mexico from May 18, 1822, to March, 1823, when he offered his abdication to Congress. Congress granted him a yearly pension on condition of his leaving the country, and he resided in Leghorn about a year, when he made an attempt to recover the crown. He landed with but a single attendant, and was arrested and shot.

I'van (or Iwan), the name of several rulers distinguished in Russian history. IVAN III (or I) (1440–1505), grand prince of Moscow, ascended the throne, 1462. He greatly enlarged his hereditary possessions, and married Sophia, niece of the last Byzantine emperor, thus introducing the double-headed Byzantine eagle into the Russian coat of arms. He was the first that bore the title of czar of Great Russia, and proclaimed the unity and indivisibility of the Russian dominions. IVAN IV (or II) (1530–1584), grandson of the former, succeeded in 1534, was crowned in 1547. His atrocities gained him the name of *The Terrible*. Yet he did much to civilize and improve his people, introduced learned men, artists, and mechanics into Russia, and concluded a commercial treaty with England.

Ivory, the osseous matter of the tusks of the elephant, and of the teeth or tusks of the hippopotamus, walrus, and narwhal. Ivory is esteemed for its beautiful white or cream color, its hardness, the fineness of its grain, and its susceptibility of a high polish. That of the African elephant is most esteemed by the manufacturer for its density and whiteness. It is used as a material for knife handles, pianoforte keys, etc. The ivory of the hippopotamus is preferred by the dentist, being free from grain and much harder and of a purer white than that of the elephant. The shavings and sawdust of ivory may by burning be converted into a black powder, used in painting, named *ivory black*. Ivory may be stained or dyed; a black color is given it by a solution of brass and a decoction of logwood, a green one by a solution of verdigris; and a red by being boiled with Brazil wood in lime-water. The use of ivory, chiefly for ornamental purposes, was well known in early ages. Among the Greeks it was employed for statuary purposes, etc. The medium weight of an elephant's tusk is 60 lbs., but some are found weighing 170. Ivory is an important article of African trade, and the number of elephants annually killed must be great; indeed, the extermination of this noble animal is only a question of time.

Ivory, VEGETABLE. See *Ivory Palm.*

Ivory Black, a fine kind of soft black pigment, prepared from iron dust by calcination, in the same way as bone black.

Ivory Nuts. See *Ivory Palm.*

Ivory Palm. a low growing, palm-like plant, native of the warm parts of South America. It has a creeping caudex or trunk, terminal pinnatifid leaves of immense size, male and female flowers on different plants, and fruit in the form of a cluster of drupes, weighing about 25 lbs. when ripe. Each drupe contains 6 to 9 seeds, as large as a hen's egg, the albumen of which when ripe is close-grained and very hard, resembling the finest ivory in texture and color. It is therefore often wrought into buttons, knobs for doors or draws, umbrella handles, and other articles, and is called *Vegetable Ivory*. The seeds are also known as *Corozo nuts*, and are imported in considerable quantities.

Ivry-la-Bataille (iv-rē-lå-bå-tā-yė), a village in France, 40 mi. w. of Paris, where a battle was gained by Henry IV in 1590 over the forces of the League.

Ivy, a climbing plant. The leaves are smooth and shining, varying much in form, from oval entire to three and five lobed; and their perpetual verdure gives the plant a beautiful appearance. The flowers are greenish and inconspicuous, disposed in globose umbels, and are succeeded by deep green or almost blackish berries. The common English ivy is found throughout almost the whole of Europe, and in many parts of Asia and Africa. It is plentiful in Britain, growing in hedges, woods, on old buildings, rocks, and trunks of trees. A variety, called the Irish ivy, is much cultivated on account of the large size of its foliage and rapid growth. Several varieties of ivy are grown in American gardens. The ivy attains a great age, and becomes several inches thick. The wood is soft and porous, and when cut into very thin plates may be used for filtering liquids. In Switzerland and the south of Europe it is employed in making various useful articles. The ivy has been celebrated from remote antiquity, and was held sacred in some countries, as Greece and Egypt.

Ivy, showing the aerial rootlets.

Ixi'on, in Greek mythology, king of the Lapithæ in Thessaly, who for his wickedness was punished in the infernal regions by being tied to a perpetually revolving fiery wheel.

Izucar', a town of Mexico, 90 mi. s.e. of the capital, at the base of the Popocatepetl, the center of a rich sugar region. Pop. 12,000.

J

J, the tenth letter in the English alphabet, and the seventh consonant. The sound of this letter coincides exactly with that of *g* in *genius*. It is therefore classed as a palatal, and is the voiced sound corresponding to the breathed sound *ch* (as in *church*). The sound does not occur in Anglo-Saxon, and was introduced through the French. As a character it was formerly used interchangeably with *i*, and the separation of these two letters in English dictionaries is of comparatively recent date.

Jabalpur (*ja-bal-pör'*) (Jubbulpore), a town of Hindustan, capital of Jabalpur district, Central Provinces. It has a school of industry, in which large quantities of tents and carpets are made. Pop. 75,705. The district has an area of 3,918 sq. mi., a pop. of 687,233. A division or commissionership of the Central Provinces has also the same name. It has an area of 18,688 sq. mi., a pop. of 2,201,633.

Jacamar', a genus of brilliant birds nearly allied to the kingfishers, differing however by the form of their beak and feet. They live in damp woods, and feed on insects. Most, if not all, are natives of tropical America.

Common Jacana.

Jac'ana, the common name of grallatorial, or wading birds, having long toes with very long nails, so that they can stand and walk on the leaves of aquatic plants when in search of their food, which consists of worms, small fishes, and insects. They inhabit marshes in hot climates, and somewhat resemble the moor hen, to which they are very closely allied.

Jacita'ra Palm (*Desmoncus macroacanthus*), a palm found in the forests of the lowlands of the Amazon district in South America. It has a slender, flexible stem, often 60 or 70 ft. long.

Jack, from Fr. *Jacques*, James, which being a very common personal name in France, came to stand for any common fellow, or menial, and was substituted for the equally common English name John. Hence its application in such terms as *boot-jack*, *smoke-jack*, *roasting-jack*, etc., and also in several senses alone. Thus a *jack* is an apparatus for raising great weights by the application of strong screws. The flag called a *jack* is strictly one displayed from a staff on the end of a bowsprit. See *Union Flag*.

Jack (or Jaca), a tree of the breadfruit genus, a native of India. The fruit grows to a larger size than the breadfruit, often weighing more than 30 lbs; but it is neither so palatable nor so nutritious. It forms a great part of the food of the natives in some parts of India, Ceylon, etc. The timber is of a yellowish color, and is used for many purposes.

Jackal, an animal of the dog genus, resembling a dog and a fox, a native of Asia and Africa. The general color is a dirty yellow. The jackal is gregarious, hunting in packs, rarely attacking the larger quadrupeds. They feed chiefly

Common Jackal.

on carrion, and are nocturnal in habits. The jackal interbreeds with the common dog, and may be domesticated. The common jackal is the most widely distributed. Another species is found in Southern Africa, the black-backed jackal.

Jack-a-Lantern. See *Ignis Fatuus*.

Jackdaw, a common British bird of the crow family, smaller than the rook, having a comparatively short bill and whitish eyes; hinder part of the head and neck of a grayish color, back and wings glossy black. The average length is about 12 in. The nests are built in towers, spires, and like elevated situations, and often in towns. The eggs, from five to six, are of a greenish color. It is easily tamed and makes an interesting pet.

Jackson, county seat of Madison co., Tenn., 85 m. n. e. of Memphis; on the Forked Deer river, and on the Illinois Central, the Mobile & Ohio and the Nashv., Chatt. & St. L. railroads. It has an extensive cotton trade. Among its manufactures are cotton goods, cottonseed oil, boilers and engines, spokes, skewers, plows, sewing machines and carriages. There are also grain mills, woolen

mills and a trousers factory. Jackson is the seat of the Sonthwestern Baptist University, Lane University and the Memphis Conference Female Institute. Pop. 1900, 14,511.

Jackson, Jackson co., Mich., 37 mi. s. of Lansing on Grand River. Railroads: L. S. & M. S.; Grand Trunk; and Michigan Central. Industries: railroad machine shops, extensive road cart, milling machinery, middlings purifier works, and numerous other manufactures. Surrounding country agricultural and mineral. It is the seat of the state prison. Pop. 1900, 25,180.

Jackson, Hinds co., Miss., state capital, 183 m. n. of New Orleans on Pearl river. Railroads: Illinois Central, Yazoo and Miss. Valley and Q. & C. Route. Industries: Many manufactures, and a large trade in cotton and other farm produce. The city is in the center of a rich cotton-growing region. It is the seat of the state penitentiary and institutions for the deaf, dumb and blind. Population, 1900. 7,816.

Jackson, Andrew (1767–1845), president of the U. S., was b. in South Carolina, his father, by origin a Scotchman, having died before his birth. In his fourteenth year, on the outbreak of the American Revolution, he joined a regiment of volunteers to fight in the cause of independence. After losing two brothers in the struggle, he retired from military service and devoted himself to law. He became a judge of the supreme court, representative of Tennessee in Congress, and senator. When, in 1812, war was declared against England, he was made major general of the Tennessee militia. In 1813 he defeated the Creek Indians, who were wasting the country with fire and sword, and made himself master of Pensacola. While engaged in the defense of New Orleans, he established his military reputation by his repulse of the British there in 1815. His arbitrary proceedings, however, incurred general censure, and he was condemned to pay a heavy fine. From 1817–18 he was employed against the Seminole Indians, but again sullied his reputation by excessive severity. In 1828 and again in 1832 he was elected president, and the eight years during which he held this office were marked by the rapid spread of democratic tendencies. In 1837 he retired to his estate in Tennessee, where he died. Pl. 22, Vol. III.

Jackson, Thomas Jonathan (1824–1863), better known as *Stonewall Jackson*, an American general. In 1842 he entered the military academy at West Point as cadet. Four years later he received a second-lieutenant's commission, and was engaged in the Mexican War. In 1851 he resigned his commission and was appointed professor of mathematics and artillery tactics in the military institute at Lexington, Va. On the outbreak of the Civil War in 1861 he entered the Southern army with the rank of brigadier general. By the end of the year he was made major general. In June, 1862, he repelled Fremont at Cross Keys, and routed McDowell near Fort Republic. In August he gained the second battle of Bull Run, and captured Harper's Ferry in September. In the same month he supported Lee at Antietam, and again at Fredericksburg in December. In 1863 he took a prominent part in the battle of Chancellorsville. On the evening of the battle he d. of wounds inadvertently received from his own men. He was a man of indomitable energy. Pl. 20, Vol. III.

Jacksonville, Morgan co., Ill., 34 mi. s.w. of Springfield. Railroads: Jackson & S. Eastern; C. & A.; and Wabash. Industries: woolen mills, carriage factories, brick yards, and planing mills. It is the seat of the Illinois College, Conservatory of Music, and School of Fine Arts, a state asylum, and institutions for the deaf, dumb, and blind. Pop. 1900, 15,078.

Jacksonville, Duval co., Fla., 155 mi. s.w. of Savannah, Ga., on St. John's River. Railroads: Savannah, Florida & Western, and several others. Industries: ice factories, coffee and spice mills, fruit packing, lumber and cigars. It has an excellent harbor for foreign commerce in lumber, cotton, sugar, fruits and vegetables. It is a noted winter resort. The city was swept by fire May 3, 1901. Over 130 blocks of buildings were burned. Several thousand people were rendered homeless and $10,000,000 worth of property was destroyed. Pop. 1900, 28,429.

Jacob, the son of Isaac, and the grandson of Abraham, the last of the Jewish patriarchs, and the true ancestor of the Jews. Having craftily obtained from the blind and infirm Isaac the blessing of the firstborn in place of his brother Esau, he was obliged to flee from the anger of his brother, and took up his abode with his uncle Laban. Here he served twenty years, and obtained Leah and Rachel as his wives. On his return to Canaan he was met by an angel, with whom he wrestled all night, and having gained the victory was thereafter named *Israel*, that is, *the hero of God*. Hence the Hebrews from him are called Israelites. Jacob died, aged 147 years, approximately about 1860 B. C., and according to his wish was buried in the tomb of Abraham, before Mamre in Canaan.

Jac′obins, the most famous of the clubs of the first French revolution. When the states general assembled at Versailles in 1789, it was formed and called the *Club Bréton*. On the removal of the court and national assembly to Paris it acquired importance and rapidly increased. It adopted the name of Société des Amis de la Constitution, but as it met in a hall of the former Jacobin convent in Paris, it was called the Jacobin Club. It gradually became the controlling power of the revolution, and spread its influence over France, 1,200 branch societies being established before 1791, and obeying orders from the headquarters in Paris. In 1791 the publication of the *Journal de la Société des Amis de la Constitution* increased the zeal and number of the societies. The Jacobins were foremost in the insurrectionary movements of June 20 and August 10, 1792; they originated the formidable *commune de Paris*, and changed their former name to Les Amis de la Liberté et de l'Egalité. For a while they ruled supreme, and the Convention

itself was but their tool. Robespierre was their most influential member; they ruled through him during the Reign of Terror, and were overthrown after his downfall in 1794. In that year the Convention forbade the affiliation of societies; the Jacobin Club was suspended and its hall was closed. The term Jacobin is now often used to designate any one holding extreme views in politics.

Jac′obites, Monophysite Christians in the East, who were united by a Syrian monk, Jacobus Bardai (578), during the reign of Justinian, into a distinct religious sect. The Jacobites, so styled from their founder, consist of about 30,000 or 40,000 families, and are governed by two patriarchs, appointed by the Turkish governors, one of whom, with the title of the *Patriarch of Antioch*, has his seat at Diarbekir; the other resides in a monastery near Mardin, under the style of *Patriarch of Jerusalem*. Circumcision before baptism and the doctrine of the single nature of Christ (hence their name *Monophysites*) are common to them also to the Copts and Abyssinians; but in other respects they deviate less than the other Monophysites from the discipline and liturgy of the orthodox Greek Church.

Jac′obites, a party in Britain (so styled from Lat. *Jacōbus*, James), who after the revolution in 1688 continued to be the adherents of the dethroned King James II and his posterity.

Jacquard (zhȧk-är), Joseph Marie (1752–1834), the inventor of the famous machine for figured weaving named after him, was b. at Lyons, France. His parents were silk weavers, and he learned the same trade. After a long period of hardship he made his name famous by the invention of his new loom, which was publicly exhibited in 1801. He endeavored to introduce it into general use in Lyons, but was mobbed, and all but lost his life. Ultimately, however, his invention was bought by the French government, and he was able to spend the latter part of his life in comfortable independence.

Jacquard Loom, a form of loom, the characteristic of which is a contrivance appended to it for weaving figured goods in various colors.

Jacquerie (zhäk-rē), the name given to the rising of the French peasantry against their lords in the middle of the fourteenth century after the battle of Poitiers. They committed great devastations and outrages, particularly in the northeast of France. They were at length quelled by Captal de Buch and Gaston Phébus, count of Fois. The term *Jacquerie* is derived from *Jacques Bonhomme*, a familiar epithet for a peasant.

Jade (or Jahde) (yä′de), a small strip of coast territory belonging to the Prussian province of Hanover, but locally in the grand-duchy of Oldenburg, at the entrance of Jade Bay. It was acquired by the Prussian government for the purpose of constructing a naval port and shipyard, and here has grown up Wilhelmshaven (which see).

Jade, an ornamental stone, also called nephrite, a native silicate of calcium and magnesium, usually of a color more or less green, of a resinous or oily aspect when polished, hard and very tenacious. It has been used by rude nations for their weapons and implements, and has been and is highly prized for making carved ornaments in China, New Zealand, and among the native races of Mexico and Peru. Jade celts or axes are common among uncivilized races, and prehistoric specimens have been found in Europe, though the stone itself is not found there. A similar stone, more properly called *jadeite*, is frequently confounded with jade proper. It is a silicate of aluminum and sodium.

Jaen, (*hȧ*-en′), a picturesque town, Spain, Andalusia, capital of the province of Jaen, 122 mi. e.n.e. of Seville. It is the seat of a bishop, and has two cathedrals. Pop. 24,392.

Jaffna (or Jafnapatam), a town in Ceylon, at the northern extremity of the island, originally a Dutch settlement, and still thoroughly Dutch in architecture and aspect. Most of the inhabitants are Tamils and Moors. Pop. 35,000.

Jagannatha (*jag-a*n-nät′*hȧ*; Skr. "Lord of the World"), often written *Juggernaut*, the name given to the Indian god Krishna, the eighth incarnation of Vishnu, and to a very celebrated idol of this deity in a temple specially dedicated to Jagannâtha at Puri, a town in Orissa, on the Bay of Bengal. It is a very rudely cut wooden image, having the body red, the face black, and the arms gilt; the mouth is open and blood-red; the eyes are formed of precious stones. It is covered with magnificent vestments and seated upon a throne between two others—his brother Bala-Rama and his sister Subhadra, colored respectively white and black. Great numbers of pilgrims, sometimes a hundred thousand, at the time of the festivals of Jagannâtha, assemble from all quarters of India to pay their devotions at his shrine. On these occasions the idol is mounted on a huge car resting on sixteen wheels, which is drawn by the pilgrims to his summer home. The task requires several days on account of the great weight of the car and the sandy condition of the roads. The pilgrims become exhausted and usually secure professional car haulers to complete the task. There is no truth in the popular belief that the devotees prostrate themselves before the car to be crushed.

Jag′gery, a coarse brown sugar made in the East Indies by the evaporation of the juice of several species of palms. It is chemically the same as cane sugar.

Jaguar (ja-gwär′), the American tiger, a carnivorous animal of South and Central America, sometimes equaling a tiger in size, of a yellowish or fawn color, marked with large dark spots and rings, the latter with a dark spot in the center of each. It rarely attacks man unless hard pressed by hunger or driven to bay. The skin is valuable, and the animal is hunted by the South Americans in various ways.

Jail Fever, a dangerous disease once very prevalent in prisons, and which is now considered to be merely a severe form of typhus fever.

Jainas, (or Jains), a Hindu religious sect, which, from the wealth and influence of its members, forms an important division of the Indian population. The sect was very numerous and important in the eighth and ninth centuries of the Christian era, and they have left many monuments of their skill and power in the fine temples built in different parts of the country. Jainism was an offshoot of Buddhism, with which it has many leading doctrines in common, but is distinguished from it by its recognition of a divine personal

Jaguar.

ruler of all, and by its political leanings toward Brahmanism. The Jains reverence certain holy mortals, who have acquired by self-denial and mortification a station superior to that of the gods; and they manifest extreme tenderness for animal life.

Jaipur (jī-pör′) (or Jeypore), a state in Rajputána, Hindustan, governed by a maharajah, under the political superintendence of the Eastern States Agency; area 15,349 sq. mi. Corn, cotton, tobacco, opium, sugar cane, are extensively raised. There are manufactures of enamel work on gold, of woolen cloth, etc. Pop. 2,832,276. The capital, Jaipur, one of the finest of modern Hindu cities. Pop. 158,890.

Jaisalmer (jī-s*a*l-mār′) (or Jeysulmeer), a state of India in Rajputána, under the political superintendence of the Central India Agency; area 16,447 sq. mi. Pop. 108,143. Jaisalmer, the capital, is situated on a rocky ridge. The palace, the Jain temples in the fort, and the houses of the wealthy are remarkable for exquisite stone carving. Pop. 10,965.

Jalandhar (j*a*l-*a*n-dh*a*r′) (or Jullundur), a town of Hindustan, headquarters of district of same name, in the Punjab. Pop. 52,119. The district, a fertile tract between the Sutlej and the Beas, has an area of 1,332 sq. mi., a pop. of 789,555. A division or commissionership has also this name. Area 12,571 sq. mi.; pop. 2,421,781.

Jal′ap (so called from *Jalapa*, in Mexico, whence it is imported), the name given to the tuberous roots of several plants. This is a twining herbaceous plant, with cordate-acuminate, sharply auricled leaves, and elegant salver-shaped, deep, pink flowers, growing naturally on the eastern declivities of the Mexican Andes, at an elevation of from 5,000 to 8,000 ft. The jalap of commerce consists of irregular ovoid dark brown roots varying from the size of an egg to that of a hazelnut, but occasionally as large as a man's fist. The drug jalap is one of the most common purgatives, but is apt to gripe and nauseate. It has little smell or taste, but produces a slight degree of pungency in the mouth.

Jalap; *a*.—the root.

Jalapa (or Xalapa) (*h*à-lä′pà), a city, Mexico, department of and 52 mi. n.w. of Vera Cruz. It is the residence of the wealthiest merchants of Vera Cruz, and enjoys a fine climate. The *jalap* root is found abundantly here. Pop. 10,000.

Jalisco (*h*à-lis′kō) (or Guadalajara), a state of the Mexican Confederation, bounded on the west by the Pacific. It is chiefly mountainous, but well watered and wooded, and the climate is healthy. The soil is fertile, and wheat and barley are abundantly produced. The capital is Guadalajara. Pop. 1,161,709.

Jamaica, one of the West India Islands, 80 or 90 mi. s. of Cuba, the third in extent, and the most valuable of those belonging to the British; area 4,256 sq. mi. Its capital is Kingston. The island as a whole is very beautiful, and much of it is fertile. The coast is indented with a number of good harbors, of which Port Royal, or the harbor of Kingston, is the most considerable. The interior is traversed by lofty mountains in all directions; the principal chain, called the Blue Mountains, reaching the height of 7,270 ft. Earthquakes of a violent character have been frequent. The climate in the districts along the coast is, in most places, exceedingly hot. There are two rainy and two dry seasons. Among the indigenous forest trees are mahogany, lignum-vitæ, ironwood, logwood, braziletto, etc. The native fruits are numerous, and many of them delicious; they include the plantain, guava, custard apple, pineapple, sour-sop, sweet-sop, papaw, cashew-apple, etc. The orange, lime, lemon, mango, grape, bread-fruit tree, and cinnamon tree, have all been naturalized in the island. The chief cultivated vegetable products are sugar, coffee, maize, pimento, bananas, and other fruits, ginger, arrow-root. Sweet potatoes, plantains, and bananas form the chief food of the blacks. The cinchona tree has been introduced, and is spreading. Of wild animals only the agouti

and monkey are numerous. Sugar, rum, coffee, dyewoods, fruit, and pimento are chief exports. The government is vested in the governor, assisted by a privy council, and a legislative council composed of fifteen members, nine elected, the others nominated or *ex officio*. Spanish Town and Kingston are united by railway, and the total number of miles open for traffic is about 70. Education is rapidly extending. Pop. 639,491.

Jamaica was discovered by Columbus in 1494, in his second expedition to the New World. It was taken by Cromwell in 1655, and ceded to England by the treaty of Madrid in 1670. Since the abolition of slavery the prosperity of Jamaica has greatly decreased. Of late many Chinese and coolies have been employed in agriculture. In 1865 a serious revolt broke out among the blacks at Morant Bay, and was put down with considerable severity by Governor Eyre. Since that time signs of disaffection have disappeared, and a greater state of comfort is said to prevail among the inhabitants generally. Politically dependent on Jamaica are the Cayman Islands, and the Turks and Caicos Islands.

Jamaica, Queens co., N. Y., 12 mi. e. of Brooklyn, on Long Island. Railroad, Long Island. It has a number of carriage factories. It is largely a residence town, being the home of many New York and Brooklyn business men. It was included in Queens borough of Greater New York in 1898.

James, St., called the *Greater*, the son of Zebedee and the brother of John the evangelist. Christ gave the brothers the name of Boanerges, or *sons of thunder*. They witnessed the transfiguration, the restoration to life of Jairus's daughter, the agony in the garden of Gethsemane, and the ascension. St. James was the first of the apostles who suffered martyrdom, being slain by Herod Agrippa A. D. 44. There is a tradition that he went to Spain, of which country he is the tutelary saint.

James, St., called the *Less*, the brother or cousin of our Lord, who appeared to him in particular after his resurrection. He is called in Scripture the *Just*, and is probably the apostle described as the son of Alphæus. He was first bishop of Jerusalem, and in the first apostolic council spoke against those wishing to make the law of Moses binding upon Christians. The progress of Christianity under him alarmed the Jews, and he was put to death by Ananias, the high priest, about A.D. 62. He was the author of the epistle which bears his name.

James, a name frequent among the kings of Scotland. Of these may be mentioned James I (1394–1437); James II (1430–1460); James III (1453–1488); James IV (1472–1513); James V (1512–1542); and James I of England and VI of Scotland (1566–1625); the only son of Mary, queen of Scotland, by her cousin Henry, Lord Darnley, was b. at Edinburgh Castle. In 1567 he was crowned at Stirling. He had much trouble with his nobles, a party of whom made him captive at Ruthven Castle in 1582; but a counter party soon set him at liberty. In 1589 he married Princess Anne of Denmark. In 1603 he succeeded to the crown of England, on the death of Elizabeth, and proceeded to London. One of the early events of his reign was the Gunpowder Plot. In 1606 he established Episcopacy in Scotland. In 1613 his daughter Elizabeth was married to the elector palatine, an alliance which ultimately brought the present royal family to the throne. He wished to marry his son Charles, prince of Wales, to a Spanish princess, but this project failed, and war was declared against Spain. The king, however, d. soon after. In his reign the authorized translation of the Bible was executed.

James II, of England (1633–1701), second son of Charles I and of Henrietta Maria of France. He succeeded his brother as king in 1685, and at once set himself to attain absolute power. A rebellion headed by the Duke of Monmouth (his nephew) was easily put down, and this encouraged the king in his arbitrary measures. He even accepted a pension from Louis XIV that he might more readily effect his purposes, especially that of restoring the Roman Catholic religion. The result of this course of action was the revolution of 1688, and the arrival of William, prince of Orange. Soon James found himself completely deserted, and having quitted the country he repaired to France, where he was received with great kindness and hospitality by Louis XIV. Assisted by Louis he was enabled in 1689 to attempt the recovery of Ireland; but the battle of the Boyne, fought in 1690, compelled him to return to France. All succeeding projects for his restoration proved equally abortive, and he spent the last years of his life in acts of ascetic devotion. He d. at St. Germain's.

James III, the Pretender. See *Stuart, James Francis Edward.*

James, Edmund J. (1855——), an American educator and political economist; b. at Jacksonville, Ill., in 1855; educated at Northwestern University, Harvard, and in Germany. In 1883 he became professor of public finance and administration in the University of Pennsylvania. In 1892 he was chosen by the American Bankers' Association to make a study of European business methods, and his report is considered a standard authority. In 1896 he became director of the extension division of the University of Chicago, in 1902 president of Northwestern University, and in 1904 president of the University of Illinois.

James, Henry, (1843–), novelist and essay ist. He has lived much on the European continent and in England. His novels and tales, which depend for their interest on the portrayal of character rather than on incident are numerous. Among them are: *Daisy Miller*, *A Passionate Pilgrim*, *Roderick Hudson*, *The Portrait of a Lady*, *Tales of Three Cities*, *The Bostonians*, *Siege of London*. Mr. James has also written the life of *Hawthorne* in the English Men of Letters series.

James, William, psychologist, b. in New York in 1842, and educated at Harvard and in the German universities. In 1872 he became

paper of which the Japanese make such extensive use. In the south the sugar cane is successfully cultivated. Rice yields two crops annually, and is the staple food of the majority of the population. Tea of a superior quality is largely grown, and cotton, tobacco, ginger, melons, buckwheat, pumpkins, and cucumbers are also objects of culture; for the industry of the Japanese, like the persevering ingenuity of the Chinese, compels the most ungrateful soil to yield a liberal return.

Agriculture.—The Japanese are intensely devoted to agriculture. There is little opportunity for carrying on the other farm occupations, such as the raising of cattle, caring for butter, cheese, and meat. Eggs, fish, and game take the place of cattle products. Over 18,000,000 of the 41,000,000 Japanese are engaged in agricultural pursuits. According to the old Japanese view the Mikado was the sole landed proprietor, but a large part of the land belonged to feudal lords. This land is now the property of the state. The peculiar method of farming confines agriculture to the plains. Where farms are on hillsides, a great amount of terracing and manuring is required. Japanese farming is much more careful and more to be compared to the scientific horticulture and market gardening in the U. S. Small owners, abundance of cheap labor, and plenty of water, furnish all the requisites for success in such methods. With the advantages which are thus afforded the farmer is able to keep his lands free from weeds, well plowed, and manured. Formerly there were no enclosed estates nor pasturing herds. So great was the demand for tillable land that the houses were placed up close to the main road that there might be that added area of land which ordinarily is found about the farmhouse. Agriculture is confined to one tenth of the entire area of Japan. Were it not for the most careful attention which the farmers give to the fertilization, irrigation, and a sort of rotation of crops, that small area would be insufficient to supply the demands of the people. They have all the fertilizers common to our own fields, with the addition of fish-guano, —ill-smelling remains of herring, from which the oil has been extracted, and cess-pool matter. This fertilizer is placed in large tubs sunk in the ground, is thinned with water so that when wanted it can be taken out in pails on long handles and scattered quickly over the field of young plants. The implements used are very simple and crude, but quite serviceable in the hands of a native. The hoe and spade are preferable, since they are used to turn the soil. A roller made of a tree trunk is sometimes used. Baskets are used in place of wagons for carrying the produce. The harvest is cut close to the ground with a short sickle and left in shocks or on poles to season. The heads are then beaten in a tub to get out the grain. More often, however, the grain is carried into open sheds and is there beaten out with flails. A stamping trough is frequently seen. The Japanese farmer plants his seed in rows instead of broadcast. He starts his seed in a small bed, thus assuring a simultaneous sprouting and permitting a second crop long before the first is ripe. Except in very fertile land and mild climate they do not attempt to raise two crops. When it is done, however, the rice field is drained off and turned into a dry field where barley, wheat, peas, mustard, or radishes are cultivated.

There are two kinds of land, rice land and dry land. The former is a flooded field much like a marsh. Rice is the most important food product. Early in April the Japanese farmers make their small seed beds. A low wall, about two ft. in height, is built about a small patch, and from a neighboring canal slime is brought and spread over the bed, upon which about two inches of water is turned and the selected seeds scattered. The water is then drained off, the seeds are covered over, and at night the water is again turned on so that the frost may not injure the seeds. Every night for the forty or fifty nights which are required for the seeds to sprout and grow large enough to be transplanted, the water is turned on. In the meantime the field has been prepared with manure, carried in by the women, and by flooding. While there is still water in the field, men, women and children turn out to plant the sprouts. The method of irrigation is interesting. The water is first led into the highest rice patch (about one quarter of an acre in size). When the water has reached a certain height it overflows a low spot in the wall into the next lowest, and so on till it reaches the bottom, where it runs into the big sunken canal. In October the crop is ripe. It is then harvested and threshed as described above. The Japanese raise, more or less successfully, most of the cereals. Beans are common, the Irish potato has been known for centuries, but has not become a popular food, the sweet potato being preferred. Fruits and other edible plants are raised. Apples, pears, peaches, cherries, plums, and apricots soon lose their flavor and aroma, and degenerate in size. Dwarf-training, so popular with decorative plants, is seldom applied to fruit trees. The best fruit raised is the well-known Mandarin orange. As early as 1610 tobacco was known and used. Hemp was grown several thousand years ago. This was the chief article of clothing before the introduction of silk, wool, and cotton. To-day it is worn almost exclusively by the farmers. Rushes are used for large, coarse mats. Foot mats are made of rice straw.

Zoology.—The bear is said to haunt the woods of Yesso, and in the north of Niphon linger a few wolves and boars; these, with foxes and hyenas, are the only wild animals that Japan possesses. Those of a tamer class are not very numerous, owing to the great extent of ground occupied by the agriculturists; but some species are protected by the laws, and others by the partial abstinence of the inhabitants from animal food. The stork is as sacred in Japan as in Holland. Deer run freely about the public streets. Buffaloes and zebus abound, but are only employed for draught and burden.

Among the domesticated quadrupeds are horses, cows, dogs, pigs, and cats. Birds are numerous, and include geese, ducks, teal, pheasants, ravens, larks, pigeons, and pelicans; snakes are commonly met with, and one species, the Ourbami, grows to an enormous size. There are also tortoises and lizards, scorpions, centipedes, and other genera of the insect world. Silkworm breeding is extensively carried on, and large quantities of silk are exported to Europe; but the quality has greatly deteriorated of late years, in consequence of the bad reeling and the immense exportation of the best eggs to France and Italy, occasioned by the dearth of good seed in those countries owing to the prevalence of the disease called pebrine. The seas and rivers teem with wholesome fish, which forms an important article of food with both upper and lower classes.

Mineralogy.—The mineral resources of Japan are considerable, and the government during the sixteen years preceding 1884 spent largely upon mining. Since then it has allowed private enterprise to step in. Gold, silver, copper, iron, lead, antimony, tin, sulphur, coal, basalt, feldspar, green stones, granites (red and gray), rock crystal, agate, carnelian, amber, scoriæ and pumice stone, talc, alum, etc., are found in greater or less quantities. Gold is principally worked in the island of Sado; silver on the main island. Coal beds extend from Nagasaki to Yezo, the principal mines being Takashima, Miike, and Karatsu in Kyūshū, and Poronai, near Sapporo, in Yezo. Petroleum is found in small quantities near Niigata and in Yezo. The supply of sulphur is almost inexhaustible, and of wonderful purity. Good building stone is scarce.

Railroads.—The first line of railway in Japan was from Tokyo to Yokohama in 1872. Since that time the government has actively engaged in the extension of the railway system, raising the national debt to be appropriated for the construction of new lines, and at the same time numerous private companies have been organized in various parts of the empire to project several lines. The returns of 1901 show that Japan had already completed 4,026 mi., of which 1,059 miles were owned by the government; and nearly 2,000 miles were under construction. The longest line runs from Awomori to Shimonoseki, at opposite ends of the island, and measures 1,132 miles. There are also 14 tramways with 227 miles of track. More than 500 American locomotives are in daily use.

Postal System.—In the year 1871 the old existing postal system was abolished, and postal laws after the American plan were adopted and carried into force. The systems of postal money orders and savings banks were established, and the parcel post law is now in operation and there is no place in the empire where letters cannot be dispatched and delivered. As to the foreign mail, an agreement for mutual exchange of letters was settled with the U. S. in 1873.

Telegraph.—The first telegraph line was constructed between Tokyo and Yokohama in 1869. At present all important places are connected by telegraph. A submarine cable connects Nagasaki and Fusan harbor of Korea. A telephone system has recently been established and has proved very successful. In 1891 there were 13,879 mi. of telegraph in the empire.

Manufactures.—The industries of Japan may be divided into original and introduced. The original is that which has existed from ancient times. The principal industries are ceramics, weaving, embroideries, lacquer work, paper industry, metallic industry, leather work, wood, and bamboo work, carving, camphor producing, vegetable wax, salt making, sugar, saki brewing, soy brewing, oil producing, tobacco making, indigo, and raw silk producing. It is probable these industries were introduced from China and Korea, but the original trace has been obliterated. The scope of the work is generally small and is done with rude and simple instruments, especially in the fine arts. The artisans use their residences for workshops and employ only a small number of apprentices. The process of manufacturing is very tedious, but the taste and magnificence of purely Japanese arts are admired throughout the world. The principal introduced industries, that is, those brought from America and Europe, include spinning, glass work, brick making, preparation of drugs and chemicals, cement works, shipbuilding, machinery, match, paper, and soap industries. These industries are generally carried on in a large school employing many workmen, and utilizing water and steam power, thus forming a decided contrast to the native industries. The latest returns show the number of factories and workshops belonging to companies and individual persons to be many thousands with millions of capital. 739 of these factories are provided with steam engines and 464 with hydraulic engines. The silk producing factories are of first importance, cloth weaving, mining, and refining of minerals are next. Other important factories are for the manufacture of tobacco, porcelain, earthenware, matches, bricks, etc. There are numerous government workshops under control of various departments, such as the imperial mint, printing bureau, Tokyo arsenal, Osaka arsenal, woolen-cloth factory; in connection with the war department, several dock-yards, naval arsenals, gunpowder factories, etc., all of which are engaged in the manufacture of goods required by the government. Of the various native industries and arts we shall speak more in detail.

Ceramics.—The ceramic art was probably introduced into Japan about 27 B. C. It was not until 1211 A. D. that any great, material advancement was made in the art. This advancement was due to the fact that the Japanese had visited Chinese potteries and learned the art which was much more highly developed in China than in Japan. The pottery may be divided into two great groups. The first is known as burnt earth, and refers to soft ware; and the second division is known as burnt stone, and refers to hard ware. As

to the soft ware, the material is opaque and shows the original fracture. It is easily scratched with a knife point, is porous, and generally permits filtering through of liquids. The materials of which this work is composed are not as carefully chosen as in the case of hard ware, nor are they so carefully prepared. The soft wares are burned in a smaller degree of heat. The hard ware has a glaze which prevents the filtering through of liquids. This glaze is made the foundation for further decoration. It is usually either an alkali or lead glaze and is formed by a union of substances named with the silicic acid contained in the raw material of the ware. This glaze is usually of two kinds: thin, transparent, and the dull, so-called, tin glaze, which lies pretty thick upon the surface and forms an opaque, milk-white enamel. The colors of the burnt clay vary on account of the mineral impurities contained in the raw material. Under soft ware again may be included unglazed earthenware, terra cotta, common pottery, and matolisa ware. Unglazed earthenware, brick tiles, etc., are the simplest and cheapest forms and usually of a brick-red, burnt clay. The dishes used for baking, the small flat plates, the mortars for preparing medicine, belong to this class. The products under the head of terra cotta are porcelain and thin glazing. Common pottery includes a large part of the earthenware dishes and the soft ware and matolisa. This product is made of pure and carefully prepared paste very much like porcelain and receives a transparent glaze. The hard and compact clay works form a large and important branch of ceramics. These hard wares are subjected to a tremendous heat and the clay mass is fused without being smelted. On cooling it becomes extremely hard and gives a clear tone when rapped. Other kinds are stone ware, porcelain, and a rather unimportant one, Jasper. The manufacture of all these wares is almost like that of porcelain and all may be treated under that head. The chief colors are a grayish white, yellow, red, and brown. The wares are dense, highly vitrified, hard, resonant, and transparent at the edges. The wares are glazed by being placed in a red hot furnace where a stream of salt is allowed to operate upon the hot ware. Muriatic acid escapes, and silicic acid then freed and in composition with salt fumes forms a pure glass glaze. The porcelain factories are comparatively small, the largest employing not over 40 to 50 laborers. All the higher labor, such as rubbing colors, glazing, etc., is performed by women, and the heavier work, such as shaping and burning, is done by men. All the work of shaping is done without the aid of machinery, with the occasional exception of water power. The chief constituents of porcelain are stone, kaolin, feldspar, and quartz. These are separately broken up, washed, sifted, etc., then weighed, measured, mixed, shaped, and baked. The preparation for the material requires two or three months. The shaping is done upon the potter's wheel; patterns, models, and molds are unknown to the best Japanese workmen. The firing is done in a low furnace heated with pine wood. The colors used in Japanese art are not strange, but appear brighter, deeper, and more effective because they are applied to a peculiar groundwork and burnt in with a great deal more heat than is common in American or European porcelain wares. The chief factories for the manufacture of the finest Japanese ceramics are at Aristo, Kioto, and Hangho.

Silk culture.— Previous to the sixteenth century the silk industry of Japan had been fostered by the government. At this time, however, it had reached the highest degree of perfection, but not until 1859 did Japan export any silk goods to America and Europe. The industry merely supplied the domestic trade. Since that time Japan has exported much raw material and the price has risen about tenfold. Silkworm raising may be divided into two principal branches,— production of eggs, and spinning. Upon the production of eggs depends a part of the silkworm yield of fine cocoons and the cultivation of the mulberry. The cocoons which are not to be spun, but are allowed to break their shells, are arranged in shell baskets for 12 or 14 days. At the end of this time the chrysalis changes into a small white moth. From 100 to 130 moths are placed on a card which in twelve hours is covered with eggs. The eggs stick to the cards and the latter are hung up by the string until autumn. Then the cards are packed in boxes, and the hatching of the eggs begins the following March. Eggs of the first quality are distinguished by their size, color, and the cleanliness of the cards. These cards are worth about $3.50 each. When the time of hatching approaches the cards of eggs are taken out of the boxes and brought to the hatching room. The hatching occurs within ten or twenty days, and the worms appear. The eggs are carefully transferred to their beds, which have been covered with delicately chopped leaves. The worms pass through four sleeps, the first occurring ten days after hatching. The worms then take on a whitish color. Food is usually given five times a day and sometimes eight times. The worms are fed with the young leaves of the early mulberry, which are hashed and sifted to keep out any possible leaf fiber. As the worms grow larger, coarser food is given them. Great cleanliness and equable temperature are essential. When the worms are undergoing their sleeps, a layer of rice bran is spread on the paper on which they lie, and above them is placed a mesh of thread covered with chopped mulberry leaves. Twice between each sleep the worms are placed upon the thread-like mesh while the mat beneath with its debris, food remnants, and possibly dead worms, is withdrawn, cleaned, and replaced with fresh food. After the fourth sleep the worms grow rapidly and are separated on more beds so as to give them more room; 100 worms are usually put on a bed a foot square. When the change of skin is drawing near, the worm becomes somewhat brighter, smoother, and translucent. Its head swells, and it re-

mains dormant for about a day. Then begins the spinning. Care is taken to keep the nursery well aired and clean. The worms are placed on a straw affair; a light brown liquid exudes from the worms, and they become restless. The worm does not raise itself up, but draws one or more leaves about it, spins them together over its head and fastens its cocoon to them. In making the cocoon it first weaves about itself a transparent net of fine yellowish-green silk through which it can be seen industriously spinning. After six hours the cocoon becomes opaque, and in about six days it is completed. Their form is elliptical. The top layer is coarse and a greenish yellow, and the under layer is a fine greenish white silk. The finest cocoons are selected, the pupa in the cocoon is killed at the proper time to permit the bursting of the shell. All the cocoons stained by premature death of the chrysalis, pierced cocoons, double cocoons, and cocoons spun together, not fit for reeling, are put aside for the silk manufacturers. The uninjured cocoons are then sorted into classes having similar shades of color, size, and quality. Cocoons are unwound fifty days after formation, and are allowed to burst. They are maintained at a temperature of 66° to 72° F. Moths make their appearance after eleven to fifteen days and breeding takes place at once. In unwinding the cocoons they are dipped into hot water and agitated with little sticks, to which the silk becomes attached. The reeling consists of rolling the silk in skeins on little bobbins after being wet and dried. In reeling off the silk from eight to thirteen threads are spun together in a thread according to the size of the raw silk desired. The old hand looms are used in the weaving of fabrics. The twisting is done by means of a reel. Doubling consists in reeling upon bobbins several strands united singly on other bobbins. The total export value of silk fabrics amounts to $200,000, manufactured principally in Tōkyo, Osaka, Yokohama, Kioto, and Kobe. The variety contains curtains, table cloths, chair cloths, bed cloths, printed figures, and clothes. Raw silks are divided into extra, best, good, medium, and inferior. The principal producing districts are Nagano, Shiga, Gifu, Yamagata, and Miyagi. The total export value of silk handkerchiefs is about $2,800,000. Silk handkerchief export at present consists of white silk which is produced at Tokyo, Yokohama, and Kobe principally. See colored plate, *Silkworm—Silk*.

Temple Architecture.—There are two kinds of temples, Shinto and Buddhist. The Shinto temples are small and unadorned, the Buddhist are as elaborate as Japanese art can make them. Japanese temples are not single buildings, but rather religious cities or villages. An ordinary temple includes 20 or 30 buildings grouped on a hill or mountain side. The temple grounds are usually enclosed within a wall. The temples are built of a wood called *Hinaki*. This wood is very hard and native to Japan. Stone is very seldom used. The main shrine stands in the center of the enclosure and is one story high. It rests on pegs like a chair. The floor is raised 6 or 7 ft. and projects so as to form a balcony about the building. The roof is recurved at the face, and is thatched with a kind of wide reed. The walls are merely screens, which can be folded up and removed. The greatest Shinto temple is at Isè. The Japanese make pilgrimages to this temple, which consists of about fifty buildings. These include the main shrine, the oratory, near which is a cistern, where worshipers may wash themselves, the treasury, where the temple property is kept, the priest's shrine, etc.

The Buddhist temples are very elaborate. The general plan, number of buildings, and their uses are in the main the same as the Shinto temples. These temples are designed to withstand the force of the earthquakes, also to harmonize with the Japanese landscape. The prominent features of Japanese temple architecture are the exclusive use of wood, the prominence of open spaces, the importance given to the roof, and the scrupulous care given to the details no matter how hidden from sight or of how little importance. The beams are polished as beautifully and precisely as the finest cabinet work. The edges of the doors are ornamented by interlacing masses of vines and branches, and dragons inlaid in ivory and pearl. The walls are decorated with panels and friezes of wonderful sculpture. The standards and crowns upon which the roof rests are made places for the most minute and detailed patterns. Throughout the decorations are symbolical. This gives architectural unity. The most common subjects employed in decoration are the stork, crane, water lily, lotus, bamboo, cedar, palm, iris, bat, waves, and rocks. The finest lacquer work in Japan is to be found in the Buddhist temples. Black and red are the common colors. The temples as well as the other buildings, courts, gardens, etc., are built with the ground dimensions in the proportion of 3 to 5. There are records of temples which were built in the first and second centuries A.D. The seventh and tenth centuries A. D. were the golden age of Japanese temple building. The temple of Mikko is considered the most beautiful and extravagant Japanese building.

Painting.—Japanese art is essentially decorative and in its application, to a great degree, purely industrial. Painting is quite universal in Japan, a condition due probably to their mode of writing. When a child learns to write he is able to draw as well. As an art it has a history and exists to-day in Japan as well as the more common practise of drawing. Japanese pictorial art in its main principles of style and technique must be regarded as a scion of the more ancient art of China. But in its motives it claims a share of originality equal to that of any art extant; in the range and excellence of its decorative applications it takes perhaps the first place in the world; but in the qualities of scientific completeness it falls much below the standard of modern Europe. To differentiate the principal features of its leading schools it may be said that the Buddhist is the

most ancient, the most strictly traditional, the most ornate, but in certain examples the noblest and most impressive; the Chinese school, with the Sesshin and Kano branches, displays the greatest caligraphic power, but the least invention; the Yawato-Tosa is the most national in style and motive, but the least forcible. Of the later schools the Korin is the most purely decorative; the Shijo the most natural and graceful, and the Ukiyoye the most original and versatile, but the least cultivated.

The applications of pictorial art in Japan do not differ in many important respects from those in vogue with European nations but extend more widely in the direction of embellishment of objects of utility. Mural paintings are chiefly represented by pictures drawn upon the sliding panels which occupy the place of the doors and walls, but certain portions of the solid wall may also be ornamented in a similar manner. Painted screens assume many forms, and constitute a most important part of the decorative furniture of a room. The fan is rarely complete without a pictorial or caligraphic ornament. Books and rolls, made up of drawings, with or without manuscript, and loose sketches, are produced in unlimited numbers. Lastly the painter is called upon to furnish designs for the engraver of book and broad sheet illustrations, for workers in embroidery and lacquer, for the ceramist, and for the sculptor. The *kokemous* is a pictorial scroll intended for suspension upon the wall, and is so constructed that it can roll up into the smallest possible compass when not in use. The album was the primitive form of the oriental book. The *Gaku*, or framed picture, is not commonly seen on walls. It is usually seen as a votive offering in temples or suspended over a door. The picture is executed on paper, silk, or wood and may be bordered with brocade or gilded paper. The frame is generally of lacquered wood, decorated with metallic plates. The greater part of the walls of a Japanese room to the height of about six feet from the floor is generally represented by sliding panels. These panels serve to transmit light, being lattice work covered with paper. The paintings on the karakami of the apartments in the Imperial Palace at Kioto, represent all the various styles of painting and all classes of flowers, animal life, landscapes, and scenes of history or legend appear. The subject of a picture may extend around a whole room, or each panel may bear its separate design. There are two principal varieties of screen pictures; the stand screen and the folding screen. The first consists of a framed panel decorated upon both sides with pictures and supported by a pair of massive pediments. The latter varies in size from two to six feet in height, and from two to eight leaves. Each leaf is made up of lattice work covered with paper and the entire screen bordered with lacquered wood. The pictorial decoration as a rule occupies one side only. Each leaf may present a separate design or set of designs or a single picture may extend over the whole screen.

The materials used in painting. The receptive surfaces are paper, silk, and wood. There are about seven kinds of paper used by artists in Japan, most of which is produced in Japan. A special fabric called Egium (picture silk) has been woven since the seventeenth century. It is woven very closely and in widths to suit the artist. The silk is prepared for the reception of color by stretching it face downward upon a frame and applying a coat of dosa or sizing to the back to prevent the figures from running. Three kinds of wood are used for pictorial decoration: Keyaki, very hard and durable; Hinoki, durable, smooth, and delicate grain; and Sugi, cheap, inferior wood. The surface is usually prepared by a preliminary coating of a mixture of chalk and ochre which serves as a filler. A coat of dosa of twice the strength of that used for paper or silk is then applied and the wood is ready for use.

Colors which the Japanese prepared from native or Chinese materials and used before their intercourse with European traders, have led to important changes in the technique of painting. At the present time European pigments are largely imported and to a great extent replace the native and Chinese materials. Besides these colors gold and silver, copper and bronze and mica have been used to produce desired effects.

The brushes employed by artists are of many different shapes and sizes. They are mostly of native manufacture. The coloring is done after the full completion of the outline and it is in paintings upon silk that we find a peculiarity of Japanese painting. Strongly colored pictures are most frequently executed upon silk, because the artist can obtain certain advantages from the material by applying his ground tints upon the reverse of the sheet. The use of glazing, scrumbling, and washing to produce certain effects is fully understood and employed. The criticism of pictures, as to age, authenticity, and merit is much cultivated in Japan and the dicta of acknowledged connoisseurs are no less persuasive in that country than elsewhere. The learning which constitutes the stock in trade of the critic is, however, nearly independent of books; it is handed down from generation to generation. To reduce this science of tradition to written laws would be to vulgarize it, hence all that has been published of Japanese ideas upon Japanese art is comprised in a few brief essays.

Lacquer Work.—See *Lacquer*.

Carpentry.— The Japanese carpenters use very simple tools but they are of the very best steel and kept in good condition. In place of the bench, the Japanese simply lay a plank on the floor. For a vise they use a square, firm, upright post. Objects to be worked are tied to this, and then wedges are driven in the side to make them firm. One form of plane is a huge affair some five or six feet long, but contrary to our instincts, it is not intended to be moved, but instead is leaned against the wall and the wood drawn over it. The saws are very thin and have long cylindrical han-

dles. They are not intended to cut both on the forward and back movement but only as they are drawn toward the user. Some saws have teeth on both edges, one set being for cross-cutting and the other for ripping. The adze is used in Japan. The Japanese use this by bending over so as to form a right angle, and in all low work they never get on their knees but work bent over. When a workman wishes to split a board for a veneer, he holds a long, thin sword-like blade with his feet and against his head and moves the board across the edge of the knife. Both their chisels and small planes are drawn toward them as the operator sits on the ground and holds the wood with his feet. In fact, the Japanese are very skillful in the use of their feet, and wherever size permits the Japanese sits on the ground and holding the wood in his feet, has both hands free to manipulate his tools. The nails of the Japanese are without heads but split into two flat plates that are bent round to form a ring. For drilling holes a long-handled awl is used. The carpenter puts it between his hands and rubs them back and forth and down at the same time. For large holes they use an auger similar to ours. For nailing places above easy reach with both hands, the Japanese use a hammer which is pointed at one end. Holding a nail between his thumb and finger with the hammer grasped in the same hand, a hole is made in the wood with the pointed end of the hammer, the nail inserted, and driven in. For work on staging a round portable nail box made of bamboo is worn attached to the waist. For marking, they use a double-ended brush, made out of fibrous wood, round at one end and having a wide, sharp edge at the other. The carpenter always carries with him a box containing cotton saturated with ink. For truing, the carpenter uses an iron square rather narrower than ours. For a chalk line the Japanese use an ingenious little tool, consisting of a small piece of wood having a cavity at one end filled with cotton saturated with ink, the other end has a reel with a cord attached. Upon unreeling, the cord passes over the cotton and becomes saturated with the ink. To make a line the cord is wound around an awl fastened in the plank, and the cord snapped, giving a fine black line that is very durable. The turning lathe is a very simple apparatus. The turner has the main elements, and iron axis turned toward himself. The other end of the axis rests and moves on a support in the middle of a pan. Between them is a twisted strap ending underneath in two treadles. The workman sits with his legs in a box-like recess into which the treadles reach. When he moves the treadles up and down the axis turns, not in one direction, but now to the right and now to the left. To hold the article to be turned, the turner cuts a hollow in the cross section of wood and forces the article into it, the whole being fastened on the fork of the lathe.

Wood structures lack much in the way of solidity, adaptation, elegance, besides being an easy prey to fire. The Japanese show their skill not as carpenters and architects, but rather as joiners, turners, and wood-carvers. The simple way of living precludes all heavy furniture, and the principal things manufactured are the simple household articles such as chests, sword stands, screens, tables, trays, chairs, etc., and in these the most important work is that of the lacquerer who decorates the simple things with an artistic hand. The Japanese prefer their wood unpainted. A Japanese carpenter takes care to have his wood well seasoned, but then leaves it to last as long as it may in its own fashion. The interior carpenter work is sometimes very bizarre. There will be a natural cherry tree trunk in the middle of the principal apartment; pine stems stripped of their bark at the corners of each room; while the ceiling will be composed of broad planks selected for their beauty. A strange taste prevails for beams and boards of worm-eaten wood. The builder loves the strange patterns which the insect bores in a tree trunk. Hence he saws and planes just enough to show these fantastic filigrees and then puts them up as gate posts. He will cut a partly hollow tree into many planks and put them across the front of his house for the quaint effect they give. In the hill districts there are numbers of shops that do nothing but sell slabs sawed to preserve some odd pattern.

Woodcutting.—The wood used is very carefully selected and is of fine texture and very hard. It is cut into planks, planed and rubbed till almost lustrous and then laid away to dry; sometimes being left for years. The Japanese use but one tool for cutting, which is much like a modern steel engraver's tool. This knife is used for all kinds of work from the coarsest to the finest, the result depending entirely upon the skill of the operator. The Japanese who made the collection said the workmen look down upon one who must use many tools, thinking he is not skillful, hence this single cutting instrument. When ready to cut wood the workman puts on some peculiar oil that softens the wood, and in cutting, the aim is to show the direction of the brush in painting. The cutter holds the knife in the right hand and pushes the back of it with the middle finger of the left hand. He first cuts all around the design, removes the wood by means of chisels, washes the plank and takes a proof. From the proof he makes his corrections and additions. Lately semicircular chisels have been introduced for removing the wood in center of design. The Japanese cut as far as possible with the grain; we cut across the grain, hence technically they are not wood engravers but woodcutters. In the using of but one tool, and in this cutting, they are remarkably like the woodcutters of the sixteenth century on the Continent.

Inhabitants.—With the exception of the wilds of Yezo, peopled by 12,000 Ainos, the Japanese islands are inhabited by a single race speaking various dialects of the same tongue. Probably, but this is merely a conjecture, the Japanese are a mixed race, the issue of the intermarriage of victorious Tartar

settlers, who entered Japan from the Korean peninsula, with Malays in the south and people of the Aino race in the main island. We read in Japanese annals of constant war with savages, and in comparatively recent times the Aino race occupied the northern extremity of Honshu. There are two distinct types of Japanese face; that which is found in art designs being the aristocratic and rarer type. It is distinguished by an oval head and face, rounded frontal bones, a high forehead, a nose curved and well shaped but not prominent, narrow and slightly oblique eyes with an overlapping of the eyelid. In the man the face is almost hairless, with the exception of a narrow and short mustache. The complexion is pallid or slightly olive, and the expression demure. The commoner and vulgar type, almost universal in the northern districts, is pudding-faced, full-eyed, flat-nosed, and good-humored in expression. The stature of the race is small, and the trunk is proportionately long as compared with the legs, which are short.

Education is general and compulsory. There is a complete system of local elementary, middle, and normal schools, and a central university in the capital, with five higher middle schools as feeders, one in Tōkyō, the others at Sendai, Kyōto, Kanazawa in Kaga, and Kumamoto. There is also a higher normal school in the capital. The elementary school course extends over eight years (six to fourteen), four years being devoted to an ordinary and four to a higher course. There were in 1903, 27,000 elementary schools, 190 middle schools, and 49 normal schools, besides 36 girls' high schools, 275 technical schools, 2,686 special, and 230 kindergarten schools. There are also two universities, one at the Capital and one at Kioto. The former consists of six colleges,– law, medicine, engineering, literature, science and agriculture. It is attended by almost 3,000 students and has 222 instructors. It has included at one time upon its staff, 8 German professors, 7 British, 1 American and 1 French, and is very well supplied with the best of modern equipment. Other institutions in the capital are the Music Academy, the Technological School, the Dendrological School, the Nobles' School, attended by the young crown-prince, the Peeresses' School, the Girls' Higher School, the Ladies' Institute, the English Law School, the Higher Commercial School, besides eight other commercial schools in the country. Education is perfectly free from class restrictions, even the Nobles' School being by no means exclusively aristocratic. Mission schools have been doing excellent work. The capital is full of private schools and colleges, the Semmon-Gakkō, founded by H. E. Count Okuma; the Keiō-Gijiku, conducted by Mr. Fukuzawa, one of the leaders of modern Japanese thought and editor of a popular daily paper; the Kyōritsu-Gakkō, etc.

The printing press is very active. Daily newspapers abound and are sold astonishingly cheap. The press laws are stringent, and imprisonments under them frequent. Some 9,500 books were published in the country in 1888, and 470 periodicals. Japan possesses 16 libraries, with 137,200 volumes.

Religion.—Shintoism, or the worship of that sun goddess from whom the Mikado was supposed to be lineally descended, was the ancient religion of the Japanese, and was non-idolatrous. Engrafted upon the Shintu, however, were Confucianism and Buddhism—both derived from China. The reforming ministry of 1868 turned its attention to the national religion; and while refraining from proscribing Buddhism altogether, it ordered the destruction of all the Buddhist symbols and images in the temples which had formerly been consecrated to Shintu. The tenets of the present religion form the basis of the allegiance due from the subject to the sovereign. It is held that the Mikado is of divine descent, and by virtue of this descent he claims loyalty and obedience as his due.

It is worth notice that the representatives of Shintuism have hopes of propagating their tenets among Englishmen, and that the result of the visit to England of a representative of the Japanese government—a most enlightened and spiritually-minded man, of very liberal views, to report on the influence of the Christian religion on public morals—was that he reported that Christianity was far more powerless than either Shintu or Buddhism in preventing crime, and particularly drunkenness, and it was therefore resolved to make no change in the public religion of Japan. Foreign residents are permitted the free exercise of their own religions, but the propagation of them among the native Japanese is regarded with jealousy.

Many of the Japanese temples, of which there are no less than 96,000, are of great extent and magnificence. One of the largest and most celebrated in Yeddo is the temple of Asava, situated in one of the most populous quarters of the city. In every temple may be observed the same stereotyped features—an altar, an image, chandeliers, painting, and trumpery decorations of artificial flowers. An account of the *Revival of Pure Shintu*, by Mr. Satow, printed for private circulation in 1875, throws much light upon this ancient creed. From this it appears that the religious duties of the Japanese consist chiefly in worship at the temples, where they display a very reverent behavior, and the observance of festivals, pilgrimages, periodical adoration of tutelary divinities, reverence to parents, obedience to magistrates, and offerings at the tombs of their ancestors. Worship of ancestors is a cardinal point in the creed. Devotion to their memory is the mainspring of all virtues. No one who discharges his duty to them will ever be disrespectful to the gods or to his living parents.

Dress in Japan.—The change in Japanese costume has by no means kept pace with the changes in many other things, and the garments worn to-day are nearly the same as those worn before the great revolution. What change has taken place is rather among classes than masses. These are due to the wholesale introduction of European and American fashions,

and also to the introduction of some very cheap foreign material.

About 1886 the government ordered officials to wear European dress while on duty. The wave of Parisian and Berlin modes struck the women at the same time, though the empress was very much opposed to it. The court ladies made their first appearance in public in garments by Worth in 1886. For three or four years the rage became uncontrollable and any lady who did not wear European garments was considered ill-dressed. The men adopted the corresponding fashions only to a limited extent, putting them aside for the native garment while in private. The great masses never made the change. Reaction set in among the upper classes and many think a complete return to native fashions not improbable. The shoes were particularly objectionable, inasmuch as they pinched the feet, and the high heels were not suited to the peculiar shuffling gait of the people. The tight garments, too, hampered their movements greatly.

Native costumes of men. The men wear a muslin cloth about the loins next the skin. They have a loose shirt either of cotton or silk, and in cold weather they wear an under waistcoat, usually made of cotton. Over these garments is worn the *kimono*, or outside garment, which hangs straight from the shoulder and comes to the calves. At the waist this is held by a belt of thick silk. When it is very cold they put on several kimonos. The costume is not considered full and complete until they put on the *hakama*, or divided skirt. This is tied over all by cords about the waist. They have also a coat or cloak, the *haori*, which is tied in front by a knot of silk cord. The hakama is usually laid aside in private. Both the hakama and haori are usually of very fine quality; the hakama generally of bright striped material, the haori of black silk bearing on the back and sleeves the crest of the wearer.

Foot wear. The Japanese wear on their feet a small sock, only ankle high, called a *tabi*. The tabi is made like our sock except that there is a separate compartment for the great toe. The tabi is made of white or blue cotton and is several layers thick on the sole. Straw sandals, made in the shape of slippers, are worn about the house. These are fastened on by a thong which is passed between the great and second toe, hence the arrangement of the tabi. In the matted rooms the tabi is the only foot gear. People who do not walk much wear *gata*, or wooden clogs, which are fastened in the same manner as the sandals.

Head gear. In former times no head gear was worn, the head being protected from the hot sun by a fan or an umbrella. Sometimes they wore hats of straw. Now hats and caps of foreign fashion are much worn.

The men of the lower class are dressed on a less elaborate scale. Most of them wear large coats displaying large ideographs indicating their occupation or their Master's name. They wear a tight thigh covering and sometimes gaiters of dark blue cotton. For hats they wear large matted straw affairs which look like inverted punch bowls. The hat is generally covered with some blue material. They wear sandals. The *coolies* and *etas* wear as little as the police regulations will permit. In warm weather they wear nothing but trunks. Their children dispense entirely with clothing.

Dress of women. The dress of the women is very similar to that of the men. A couple of aprons or short petticoats are worn under the kimono. They are fastened about the waist by a cord. These petticoats consist of a strip of white cloth about eighteen inches or two feet wide. This is rather wound down and around the body and then fastened. Over the petticoat is worn the kimono. As many as forty and fifty kimonos are worn at one time. They are all the same shape but not all of the same quality. Many are very plain and of cheaper quality. The kimonos of the women are longer than those of the men and reach to the ankle. Those worn in full dress frequently have trains several feet in length. These are stiffened underneath with wadding. Instead of wearing so many kimonos they sometimes have one quilted with silk or cotton wad. The kimono worn by the women is heavier and of brighter color than those worn by the men. The sleeves of the kimono are very wide, hanging sometimes to the floor. Here we may find small papers which they use as we would a hankerchief.

Outside of all is worn the *obi* or broad belt. The obi is often 18 in. wide and 15 ft. long. It is wound round the body and encloses the form completely. The obi is a great feature of the whole make up. It is of the very finest material, and like our ribbons is made in special weaving factories. The obi is tied in a large butterfly bow behind and hangs down in two large streamers. Whether a lady is married or not may be ascertained by observation of the bow, those of the unmarried women being worn behind, the married in front. The cost of the obi is often as high as $50 or $75. The foot wear is the same as that of the men—the tabi and the sandal.

Hair Dressing. The women wear large metal pins, and coral head pieces or tortoises shell combs are very necessary articles. They use oil made from the seeds of camillia or tea shrub. This oil makes the hair very glossy and tractable. They either mat the hair down close to the head or else make it stand in puffs on each side of the face. The ends are fastened together in a knob at the crown of the head, just in front of which is worn a large comb. The poorer people wear combs made of wood. Married women shave off their eyebrows and blacken their teeth with a kind of ink, also the girls who do not expect to marry. This custom is very disgusting and it is falling out of use to-day.

Tea Ceremonies.—By the beginning of the seventeenth century the art of tea drinking had split up into several schools. It was for Sen-no-Rikyn (a name the Japanese revere) to gather together and purify these different

forms of service. He introduced simplicity, making it the canon that has been so rigidly observed. Ever since that time the worship of simplicity and of the antique in art and an elaborate code of etiquette have been the doctrine and discipline of the tea ceremonies. The ceremonies themselves may include a preliminary dinner but the tea drinking is the main thing. It takes place in a small building called the *cha-no-ya*, specially constructed and kept for the purpose. Every large temple and private residence has such a building. It is rather small, being only one story and divided into two rooms, the larger of which is only about 9 ft. square. There is no entrance from outside except a hole or window about 2 ft. square. This window is on a level with the floor of the house but is about 18 in. above the ground outside. When the authorities of temples give the ceremonies, a professor of etiquette has charge and the service lasts from seven o'block in the morning till one o'clock that night. When a host invites a few guests to his own private tea house, he does the honors himself.

The tea used is not to be confounded with the ordinary tea. It is a fine powder instead of a leaf. There is a thicker kind called *koi-cha*, and a thinner kind called *usu-cha*. The former is used in the earlier part of the ceremonies, the latter toward the end. The tea is made and drank in a slow and formal manner, each gesture, each action, being fixed by an elaborate code of rules. Spoon, cup, ladle, everything is handled in just such a way, picked up and set down in just such a place and at just such a time. A strained precision and exactness marks everything done. Both host and guests kneel all the time, and if the host is obliged to leave the room for something in connection with the service, he shuffles out backwards on his knees. The chief guest is the only one allowed to speak except the host, but at stated times in the ceremony each guest is expected to pick up a stated object and make some complimentary remark. In this way all the utensils of the service are admired in turn.

There is a slightly less formal service which a young lady may go through with when she receives her friends of an afternoon. The same tea is used. A special kind of charcoal is kept always at hand to heat the water which is poured on the tea in a bowl, and handed with due form to the chief guest, who is expected to empty it at three gulps. The same bowl is used for all the guests in order of their social rank. The Japanese are still very fond of all the articles and utensils of the service. They prize a rough stone jar by some celebrated maker higher than the finest china of unknown origin. They will wrap it carefully in silk, and place it in a box after using, to take it out again only at the next service, or to show as a great treasure to some new visitor or lover of curios.

Japanese Theaters.—A gong sounded from a tower announces the opening of the performances of a Japanese theater. The cages of the cashiers and check-takers constitute the bars separating the spectators of the theater from the outside. Receptacles are provided for umbrellas and shoes, the latter never being worn in theaters. The stage and auditorium are much larger than those in any metropolitan theater in America. The interior is finely furnished, but the stage is lighted only by candles. The parquet is partitioned off into little pits, each about a yard square, with no entrance except by climbing over the sides; and the main stage is in front of these pits. The pits are occupied by families who squat in them during the performance. Private boxes are constructed at the sides of the stage, and dress-circles are arranged along the wall like balconies. The spectators take their own quilts and mats with them to ease the hardness of the floor. The Japanese take their luncheons with them to the theater to eat between the acts. Friends are invited to partake of these luncheons, which constitute quite a social feature of the entertainment. The luncheon is never complete without a gourdful of *sakē*. There being no music between the acts, the intermissions are very wearisome. The performance begins in the afternoon and lasts till midnight. The ceiling is decorated by long bands of many-colored curtains. The orchestra, a very prominent feature, occupies boxes at the left of the main stage. Two men above the orchestra act, one as prompter or reader, and the other as director.

The Japanese have no opera. The passion of love is subordinate in all their plays, the main virtue being obedience to parents. Men generally take the female parts, the test of histrionic skill being the cleverness with which males succeed in thus personating females. A singular custom is that the actor upon coming on the stage is usually accompanied by two men in black veils, carrying lighted candles, who remain on the stage with him until he is through with his part.

Government.—The government of Japan was formerly an absolute monarchy, but various modifications were introduced between 1869 and 1881, and in accordance with a promise of the emperor made at the latter date, a new constitution was promulgated in 1889, under which parliamentary government was introduced in 1890.

The emperor remains the source of all laws, in so far that without the imperial approval no parliamentary measures can become law, but the making of laws is the function of the Diet, and no law can be put in force without its assent. The emperor determines the organization of every branch of the administration, appoints and dismisses all civil and military offices, and has the supreme command of the army and navy. The rights of the people are safely guarded.

The Japanese parliament consists of a House of Peers and a House of Representatives, together called the Imperial Diet, and holding an ordinary annual session of three months—which, however, may be extended by imperial orders—and extraordinary sessions in urgent cases. For the upper house there are four

classes of members—1, members of the imperial family, holding office for life; 2, counts, viscounts, and barons, not less than twenty-five years of age, elected by their fellows for seven years; 3, members nominated for life by the sovereign for meritorious service or for erudition, and above the age of thirty; 4, commoners elected in the prefectures and urban districts—one for each district—by the fifteen largest taxpayers. The lower house consists of 300 members, elected by ballot in 258 electoral districts. The suffrage is limited to males not less than twenty-five years old, who must have resided in the district at least a year before registration, and be paying direct national taxes to the amount of not less than fifteen dollars per annum, as well as income tax. Candidates for election must be at least thirty years old. The duration of each parliament is four years, unless previously dissolved. Members of the government may sit and speak in either house, but can only vote in that of which they are members.

Legal Systems.—In treating of the present legal systems of Japan it is necessary to state that they are almost entirely the product of the last thirty years, not that they have been developed in that short period by the Japanese, but that they have been imported almost wholesale from the legal systems existing in France, Germany, England, and the U. S. This period of importation began with the revolution of 1868 and the restoration of the empire. In order, then, to understand the legal systems of the Japan of to-day in their relations to the Japanese, one must know something at least about their old and native institutions.

All the evidence goes to show that the legal systems of Japan in use just before 1868 were neither clearly defined nor very fully developed; indeed, they were rather primitive and simple in their laws, organization, modes of trial, and cruel punishments. That this is so is clearly indicated by the following facts: 1, The notion of legislative power was far from being clearly defined, as everything was settled as ordained by custom or occasional decrees, which laws were, however, only sparingly used; 2, the three branches of government were not distinct—each department combined in itself, legislative, judicial, and executive powers, and exercised each and all of these at will to summarily settle with respective provinces; of these three powers, the executive was, of course, the most used and most highly developed; 3, the judicial power was by far most clearly shown in the form of criminal jurisdiction, which constituted the only judicial business of prominence in those days; the only judges were criminal; there were no civil law judges. This lack of clear distinction between the civil and criminal law, or rather the fact that the criminal jurisdiction was so much more important as to quite overshadow the civil, is a common sign of primitive development in legal systems. The law in that period was represented by the criminal department and by the protective police, two departments of independent organization. At the head of the former was a minister of criminal justice, who had the whole control of judicial business as far as criminal matters went (that is, nearly all judicial business); he heard appeals and questions of jurisdiction and instructed judges, who were to apply the law and give judgment according to the facts as found by certain judicial officers. This minister of justice was one of the chief officers of the government and had authority over local judges throughout the empire. The criminal trials were extremely crude in their simplicity, and the punishments were horribly cruel and disproportionate to the crime, as judged from the point of view of more civilized and enlightened nations. The underlying idea of condemnation was that confession was necessary to conviction, and hence arose the necessity of torture. Torture was the regular method of procedure to obtain evidence and confession. Whether innocent or guilty, the accused was compelled to testify against himself; if he did not say what, according to the preconceived notion of the judge or examiner, he ought to say, he was put to the torture. The torture consisted in several different kinds: 1, beating with bamboo rods; 2, burning with the moxa; 3, making the accused kneel on a block of wood cut with sharp ridges, while heavy flat stones were piled on his legs; 4, tying with ropes and hoisting the body up and down; 5, burning with melted copper; and in other ways too brutal to detail, the accused was made to confess either lies or truth. Griffis, in his *Mikado's Empire*, gives a cut of the old style of trial; the prisoner, torturer, secretary, and judges were the chief or only personages present. No barrister or advocates were allowed the prisoner, who was obliged to state his own case. Criminals of high rank were allowed to expiate their crimes by killing themselves with a dirk in a rather formal manner before the judge and witness; the lower grade officers or attendants were not allowed to be present; behind him stood the executioner ready to strike off his head with his short, keen sword as soon as he had thrust the dirk into his own body.

With the restoration of the empire, in 1868, came a revolution in the legal systems of Japan. A desire for the most enlightened institutions led the Japanese to turn to Europe and America for legal ideas, legal principles, and legal systems. It was resolved that there should be proper law courts, legally trained and independent judges, qualified lawyers, and a well-considered code of law for their guidance. Foreign lawyers were forthwith engaged to assist in making these changes, and several able, intelligent young men were sent to Europe and America to study law under selected teachers and in offices where they would see plenty of practise. Translations of law books of great merit were made. Systems of law were imported wholesale from Germany, France, England, and America, and this importation of the fruits of long, slow development in other peoples resulted in abnormally

rapid substitutions and replacements of the new for the old and established institutions of the Japanese. Their cruel and bloody codes had been borrowed mostly from China. Since the Restoration revised statutes and regulations have greatly decreased the lists of capital punishments, reformed the condition of prisons; and made legal processes less cruelly simple, but with elaboration of mercy and justice. The use of torture to obtain testimony is now entirely abolished; lawyers are allowed to plead, thus giving the accused the assistance of counsel for his defense. In these changes the influence of Western ideas and practise is easily traced. A brief outline of the introduction into Japan of some of the important new legal ideas will be of value. In 1871 the *Gyobusho* (criminal department) and the *Danjodai* (protective police) gave way to the *Shiosho*, or judicial department, which combined the two. It took over from the criminal department not only criminal, but also such civil business as other departments of state used to settle in a summary manner. In the *Shiosho* we begin to see a decided concentration of the legal business of the empire; and this is further shown by the fact that a distinction was now made between different classes of judicial business, and special officials were appointed to take care of certain portions. The *Shiosho* was further developed in 1872 and its concentration more marked, for it was given a general superintendence of all judicial business (the Imperial will having, however, permanent authority over all matters of importance) as found in or out of the courts. These courts were more definitely systematized, the judicial department being divided into 1, ordinary judicial courts; 2, extraordinary judicial courts; 3, prefectural courts; 4, local courts. Of the ordinary and extraordinary courts, the first of these was made a court of first instance in matters to which the government was a party, and an appellate court of new trials for cases appealed from the prefectural courts. The extraordinary court was made the supreme last court of appeal for all cases.

In 1875 the principles of common law were revised and made more lenient. Another great step was made in the promulgation of a system for new trials in civil matters and of rules for litigation between the people and the government. This clear distinction which began to be made between the civil and the criminal law shows as much as anything the great influence of the European legal systems upon the Japanese; the establishment of courts of appeal and last resort was also an innovation entirely due to importation of foreign institutions. This system of appeals was further developed in 1875 by the division of the ordinary (Shiosho) court into four courts which heard appeals from the prefectural courts, and whose judges went circuits to hear cases involving capital punishment within the prefectural courts of their respective jurisdictions. In 1890 and 1891 were promulgated and established a body of rules for a complete new system of legal institutions for the empire. It is in a great measure an embodiment of what has been in use since the establishment of the modern judicial system, only clothed in a new, strange, and uncouth language, and modified by translations from German codes of law. It is an improvement, doubtless, on the old state of things; for it gives further safeguards for judges' positions, though there is yet much to be done in this particular. The new codes consisted of the *Commercial Code*, the *Code of Civil Procedure*, and *The Whole Civil Code*, with the exception of the section referring to the law of personal relation.

The position which the law as a vocation holds in Japanese society, does much, perhaps, to explain the inefficiency of the judges and lawyers; for the professional life is looked down upon as degrading, and the young men of the best families do not enter it. The lawyer's remuneration is about the same as that of a mechanic; the judges are appointed for life, but are paid merely petty salaries. There is no mark of distinction for the successful members of the bar, and the bench is not a position of honor to look forward to. The generals and governors are more respected than even the highest judges. It is said, too, that in Japan litigation is not quite the thing, that the sensible people do not go to law unless compelled to do so by unscrupulous opponents, so that there are very few cases of importance involving business principles. Thus it appears from all these facts that the position of the lawyer and judge is somewhat inferior in the social scale. The legal training of the judges is either in the law college of the Imperial University or in one of the eight private law schools.

The situation in Japan is summed up by Majisma as follows: Importations of codes of law by single strokes of legislation has been a bad thing for Japan. Such codes are the result of a slow growth under far different circumstances. The old laws of Japan cannot be replaced by a stroke of the pen. The new codes are extraneous and artificially imposed. The country has not yet reached that stage when complicated judicial machinery can work satisfactorily, and when fine distinctions of judicial principles can be applied. And it only remains to emphasize the fact that the legal systems of Japan to-day are abnormal, that they are not in accord with the development which the Japanese have reached in life and thought, and that the investigation of these borrowed systems in relation to the results of their application only confirms our preconceived supposition that such systems, so applied, cannot be successful and satisfactory.

Suicides in Japan.— Hara-kiri is the mode of suicide adopted among the Samurai, when they have no alternative but to die. There are some who thus commit suicide by their own free will. Others are ordered by their superiors to put an end to their own lives. When a man wants to commit suicide he must have witnesses, and seconds. These must be thoroughly acquainted with all the ceremonies to be observed. The witnesses go to see and certify the suicide. For seconds men are wanted

who have distinguished themselves in military arts. If at the time of the execution the man's seconds fail to appear, men must be engaged from other quarters to cut off the head of the criminal, and for that day he must change his name and the affair is entrusted to him. Thus the difficulty is removed, nor is this considered dishonorable. It is a great breach of decorum if the second, who is the most important officer, commits any mistake (such as not striking off the head at one blow) in the presence of witnesses. According to one authority capital punishment may be divided into two kinds, beheading and strangling. The ceremony of hara-kiri was added afterward in the case of persons belonging to the military class being condemned to death. Beheading and strangling were considered cruel, accordingly men hit upon the ceremonious mode of hara-kiri, or disembowelment in order to comfort the departed spirit. When it becomes necessary to put to death a man who has been guilty of some act unworthy of a Samurai, at the time of the execution witnesses are sent to the house and the criminal having bathed and put on new clothes, in obedience to his superiors, puts an end to himself, but does not on that account forfeit his rank as a Samurai. This is a law for which men should be grateful. In early days the ceremony of hara-kiri was performed in a temple. In modern times the ceremony takes place at night either in the palace or the garden of the Daimio, to whom the condemned may have been entrusted. Whether it takes place in the palace or in the garden depends on the rank of the individual. Daimios and higher retainers disembowel themselves in the palace, while retainers of the lower rank should do so in the garden. At the present time, when hara-kiri is performed in the palace, a temporary place is made in some unoccupied spot, but if the criminal is to die on the day of his capture, the ceremony takes place in the reception room, and the place is always regarded as sacred to his memory. The place for the ceremony is eighteen feet square in all cases. In the center is a place to sit upon and the condemned man is made to sit facing the witnesses. The witnesses should be consulted on all arrangements, and if the witnesses have no objection the condemned man must be placed directly opposite them. The seats for the witnesses should be about twelve feet from the criminal. The place from which the sentence is read should also be close by. The floor is first covered with a sheet of white cotton, and two red rugs, sewed together, are laid upon this. If the execution be at night, candlesticks of white wood are placed in each of the four corners, lest the seconds be hindered in their work. The man takes his seat and quietly plunges his knife into his bowels. The second standing behind him then strikes off his head with a sword. This last act is a great honor to the executed man. The duty of burying the corpse and setting the place in order again devolves upon four men. These are selected by the Samurai of the middle and lower classes. When the execution is concluded the corpse is placed upon a screen and hidden from the sight of the chief witnesses and carried out and put in a coffin by two soldiers. The blood-stained ground is sprinkled with sand and swept clean, mats are again laid down and all is ready for the next victim. Hara-kiri is considered the best means of restoring injured honor if revenge is impossible. The Japanese calendar is filled with suicides and committers of hara-kiri. Even to-day no man can win the regard of others easier than by hara-kiri, even though he has committed a great crime.

History.—The reputed founder of the present dynasty was Jimmu Tenno, who ascended the throne in 660 B.C. The legendary epoch continues for more than 1,000 years, and all Japanese history before 500 A. D. is to be classed as legendary. In 201 A.D. the Empress Jingo is said to have invaded and conquered Korea, and this expedition was followed by the introduction of Korean civilization, the sacred Chinese books, *Rongo* and *Senjimon*, arriving from Korea in 285. In 552 Buddhism was introduced from Korea, and became, forty years later, the established religion. In 624 a Buddhist hierarch was established by government. Shortly before this direct relations had been entered upon with China, and Chinese civilization was thereafter rapidly assimilated. The system of periods commenced in 646, and from this time onward the national history is clearly traced. During the five centuries which ensued the people made immense strides in civilization. A complete system of officialdom was organized, under the rule of the Fujiwara family, whose members filled all the chief posts under government, and gave a succession of consorts to the imperial house. The decadence of this family and the growing weakness of the government favored the rise of the hitherto subordinate military class, which, in the person of Yoritomo, created Shogun or Generalissimo in 1192, seized the reins of power. The usurpation of supreme authority by this officer, long known to Europe by the Chinese name of Tycoon, led to the erroneous belief that, down to 1868, there were two emperors in Japan, one, a Mikado or spiritual emperor, who reigned but did not govern, and the Shogun, who really governed though he paid homage to the Mikado. The next four centuries until 1603 were a period of bloodshed, marked by all the untold miseries of civil strife. The military fiefs organized by Yoritomo raised up a feudal baronage, who succeeded in making themselves virtually independent of the central power. Even the Buddhist monasteries in many cases became military centers. At one time (1333–92) two puppet dynasties held sway, the north and the south, to one or other of which the feudal barons rallied. The Shogunate, made powerful by Yoritomo, itself fell into abeyance, but the military genius and astute policy of Hideyoshi, who d. in 1598, prepared the way for its revival in 1603 by Tokugawa Iyeyasu, the illustrious general and statesman who gave a lasting peace to Japan. In 1592 Hideyoshi

had directed an expedition against Korea, inflicting a blow upon the prosperity of that country from which it has not since recovered. Iyeyasu, victorious over a combination of southern barons at Sekigahara near Lake Biwa in 1600, fixed his seat of government at Yedo, the port situated at the head of the Gulf of Yedo, and near the embrochure of the rivers which drain the largest plain in Japan. Backed principally by the northern clans, he was able to consolidate his power and to found a permanent succession, his descendants reigning at Yedo until 1868. From being a collection of small scattered villages this place soon became one of the most populous cities in the world. His system was perfected by Iyemitzu, the third Shogun of the Tokugawa dynasty.

The Portuguese, who first landed in Japan in the year 1543, carried on a lucrative trade; but by and by the ruling powers took alarm, ordered away all foreigners, and interdicted Christianity (1624) believing that foreigners impoverished the country, while their religion struck at the root of the political and religious systems of Japan. The Portuguese continued to frequent Japan till 1638, when they and their religion were finally expelled. From this time the Japanese government maintained the most rigid policy of isolation. No foreign vessels might touch at Japanese ports under any pretense. Japanese sailors wrecked on any foreign shore were with difficulty permitted to return home; while the Dutch, locked up in their factory in Deshima, were allowed to hold no communication with the mainland; and the people lived "like frogs in a well," as the Japanese proverb has it, till 1853, when they were rudely awakened from their dream of peace and security by Commodore Perry steaming into the harbor of Uraga with a squadron of U. S. war vessels. He extorted a treaty from the frightened Shogun, Mar. 31, 1854, and Japan, after a withdrawal of 216 yrs., entered once more the family of nations. Other countries slowly followed the example of the U. S. until sixteen in all had obtained the same privileges.

Five ports,—Kanagawa (Yokohama), Kobe (Hyogo), Nagasaki, Niigata, and Hakodate,—were opened to foreign commerce, settlements or foreign quarters in these being set apart for the residence of foreigners under the jurisdiction of their own consuls. A limit of travel, extending to a radius of 25 mi. round these ports, was granted. Foreign settlements were also established in Yedo (Tokyo) and Osaka, these settlements being within the prescribed twenty-five miles' limit of Yokohama and Kobe. Obstructions being placed in the way of foreign merchants settling at Kanagawa, the question was quickly solved by their crossing the narrow bay, now filled up, and erecting their hongs at Yokohama, a few miles farther from the capital. With the opening of these ports commenced the extra-territoriality system under which Japan has shown herself so restive.

The fall of feudalism was merely accelerated by the arrival of foreigners. For long not a few of the most powerful clans, chiefly Satsuma and Coshu, had been dissatisfied with the Shogun's position, and these gladly availed themselves of the pretext now furnished for opposing him. All possible means were taken to involve him in complications with the ambassadors at his court; and to this motive, rather than to any hatred of foreigners, are to be ascribed the numerous assassinations which darkened the period immediately prior to 1868. Every weakening of his power was a step gained toward his overthrow and the longed-for unification of the empire in the hands of the Mikado (emperor). At length the Shogun resigned; but it was only after a sharp civil war in the winter of 1867–68 that the power of his adherents was completely crushed. Recognizing Yedo as the center of the nation's life, they resolved to make it the capital; but the name Yedo being distasteful through its associations with the Shogunate, they renamed the city Tokyo or Tokei, i.e., "eastern capital." Here the emperor established his court, abandoning forever that life of seclusion which had surrounded his ancestors with a halo of semi-divinity, but deprived them of all real power. The venerable city of Kyoto, which had remained the capital since 794, was at the same time renamed Saikyo or Saikei, i.e. "western capital." The daimyos, very few of whom were more than mere weaklings under the direction of strong-willed retainers, resigned their fiefs, and were pensioned by the government. Since 1868 the leading men of Satsuma and Choshu, forming what is called the Sat-cho combination, have held the important portfolios of state. Japan has striven to make her influence felt as a powerful factor in Asiatic politics. Her expedition to Formosa in 1874 to punish piracy, her annexation in 1879 of the Loo Choo Islands, notwithstanding China's remonstrances and threats, her spirited policy in Korea in 1873 and again in 1882, her conscription law of 1883 and subsequent army reorganization, her development of a strong navy, her coast defense scheme of 1887, subscribed to liberally by wealthy private individuals, prove her assertive spirit. A rebellion in 1877 of the fiercer Satsuma men under General Saigo was promptly crushed. In 1887 the negotiations for a revision of the treaties were broken off owing to an outbreak of popular dissatisfaction with the guarantees demanded by the seventeen foreign powers acting in concert. This breakdown was followed by a distinct conservative reaction in the nation. The position in which Japan has been placed during the past few decades is so exceptional that outsiders find great difficulty in forming a correct judgment of her political situation. Instability is supposed where it is really absent, the fact being that no nation's history has been more consistent than Japan's. The sudden change of front in 1868 was deliberate and final, one end having been kept in view all through, the independence and glory of Dai Nippon. So hurried an assimilation as was

made necessary by her complete previous isolation was naturally accompanied by numerous minor imprudences and extravagances, the result of ignorance. But the thoroughly patriotic spirit of the nation has triumphed, and her administration is now in a highly satisfactory condition.

The assassination in 1877 of Okubo, chief of the party whose reforms gave rise to the Satsuma rebellion, was followed twelve years later by the assassination of Viscount Mori, a cabinet minister. During the past few years, especially since the reconstruction of the cabinet and the administration in 1886, the court has emerged entirely from its seclusion. The emperor and empress have visited all the chief institutions, and are present at public spectacles. The crown-prince, Haru, was the first in the long dynasty to be educated at a public school. A new nobility was created in 1884, drawn partly from the old feudal baronage and partly from the new men of 1868. It consists of five orders, princes or dukes (11), marquises (28), counts (85), viscounts (355), and barons (102), who send representatives to the newly-created Upper Chamber. The nation is itself divided into three classes, Kwazoku (nobility), Shizoku (gentry), and Heimin (commonalty). Officials are of four classes, shinnin, chokunin, sonin, and hannin, each grade being divided into distinctly marked subclasses, so that questions of precedence are quickly settled. Officials at present constitute the flower of the nation. Class jealousy is absent, careers being open to the poorest; but there is a growing restiveness under Satcho officialdom and police surveillance which will probably find a vent in the new popular institutions.

Army and Navy.—The total army of Japan includes 49,650 infantry, 4,500 cavalry, 4,818 artillery, 2,560 engineers; total peace strength 61,529; first reserve 70,000; second reserve 210,000; total war strength 341,528. The navy includes the following: armored ships 28, with 246 guns; four unarmored ships with 48 guns; six armored gunboats with 24 guns; four dispatch vessels with 16 guns; 124 torpedo boats. Total number of guns, 334.

"Yellow War," or the China-Japan War.—In 1894 the inhabitants of Korea became involved in internal dissension, and divided into Chinese and Japanese factions. Each faction appealed to China and Japan respectively for aid. Both China and Japan sent troops to quell the riot, and the Japanese seized the Korean king and forced him to appoint a regent. Several naval battles were fought, and a formal declaration of war was made August 1. The Japanese had a decided advantage in the matter of equipment and numbers. The Chinese were poorly equipped, and had no one to conduct the war. The commanders of the Japanese forces were in almost every case graduates of European military academies, and they were supported by able corps of engineers. Before the war had progressed three months nearly the entire Chinese navy had been destroyed, and they had lost about 25,600 forces and immense quantities of supplies. In February China sent a peace embassy to Japan, and asked for peace. A treaty was signed in April, 1895, and ratified the following month. The treaty stipulated the independence of Korea, and China ceded to Japan Formosa and the province of Feng Tien, with a war indemnity of $150,000,000.

Japan took an active part in the rescue of the foreign legations in Peking during the Boxer uprising. (See *China, Revolt of 1900.*) Her troops won high praise from the powers for their efficiency and conduct. Japan is now the leading opponent to Russian aggression in China and Korea, and has recently (1902) formed an alliance with Great Britain for the purpose of resisting any movement on the part of Russia which will tend to her acquisition of territory in the far East. This alliance has the moral support of the United States.

Japanning is the act of applying varnish to such articles as wood, metal, leather, *papier-maché*, in imitation of the lacquered work of Japan and China. The article to be japanned, being made thoroughly dry, is first brushed over with two or three coats of seed-lac varnish to form the *priming*. The next coat of varnish is mixed with the *ground tint* desired, and where a design is intended it is now painted with colors. The whole is then covered with additional coats of varnish, which are dried and polished as applied. Shellac varnish or mastic varnish is employed, unless where the fineness or durability of the work requires the use of copal dissolved in alcohol.

Ja'pheth, the second son of Noah (Gen. 9:24). His descendants, according to Gen. 10:5, peopled the isles of the Gentiles, and thus Japheth is often considered the ancestor of most European nations.

Japura (or Caqueta) (*hä-pö'rä, kä-kä'tä*), a large river of South America, an affluent of the Amazon. Course 1,000 mi.

Jargonelle', a variety of early pear, of fine quality, so called from resembling in color the mineral jargon.

Jaroslav (*yä'ro-slaf*), a town in Russia, capital of government of same name, on the Volga, 162 mi. n. e. of Moscow. Pop. 23,032. The government has an area of 13,000 sq. mi. and a pop. of 1,095,636.

Jar'rah, a timber tree of Western Australia, yielding a very durable wood, useful for railway sleepers, jetties, etc., not being liable to the attack of the white ant and the ship worm.

Jar'row, a town of England in Durham, on the Tyne, 6 mi. below Gateshead. Its rapid growth from a small village to a large town is due to the development of its shipbuilding and iron-smelting industries. Pop. 33,683.

Ja'shet, Book of, a lost Hebrew work, twice mentioned in the Bible (Josh. 10:13 and 2 Sam. 1:18), about which various conjectures have been made. Some authorities suppose that it was a series of annals; others that it was a Hebrew minstrelsy celebrating the exploits of the national heroes. Whatever its contents may have been, it seems from the specimens preserved to have been metrical in form.

Jas'mine (Jas'min), the popular name of plants of the genus *Jasmīnum*. They are elegant, branched, erect or climbing shrubs, with imparipinnate, trifoliolate, or simple leaves, and (usually cymose) white or yellow flowers, from some of which delicious perfumes are extracted. There are about 100 species, most of them Asiatic; some occur in south and a few in tropical Africa, while one is a native of Southern Europe. The Carolina jasmine is *Gelsemium nitidum*. Also written *Jessamine*.

Jasmine.

Jason, in Greek legend, king of Iolcos in Thessaly, celebrated for his share in the Argonautic expedition. On his return to Iolcos with Medea as his wife, he avenged the murder of his parents and his brother by putting Pelias to death. Unable to retain possession of his throne, however, he fled to Corinth, where, after some time, he married Glauce (or Creusa), daughter of the king, and put away Medea and her children. Different accounts are given of his death.

Jasper, an impure, opaque, colored quartz, less hard than flint or even than common quartz, but which gives fire with steel. It is entirely opaque, or sometimes feebly translucent at the edges, and presents almost every variety of colors. It is found in metaphoric rocks, and often occurs in very large masses. It admits of an elegant polish, and is used for vases, seals, snuff boxes, etc. There are several varieties, as red, brown, blackish, bluish, Egyptian. *Agate jasper* is jasper in layers with chalcedony. *Porcelain jasper* is only baked clay.

Jasper, William (1750–1779), was born in South Carolina. He is known in history as Sergeant Jasper. He distinguished himself at the siege of Fort Moultrie by leaping over the parapet and rescuing the colors which had been shot away. He also distinguished himself in many later engagements and was killed in the attack on Savannah.

Jassy (yäsh'shi), a town of Roumania, in Moldavia, on the Bachlui, several miles from the Pruth. There are few manufactures, but the trade is of some importance, and a great deal of business is done at the fairs. Pop. 90,000.

Jasz-Berény (yäs-be-rāny'), a market town of Hungary, 38 mi. e.n.e. of Buda-Pest, on both sides of the Zagyva. Pop. 21,507.

Ja'taka, a celebrated Pali work of about the third century, A.D., containing legends relating to the birth of Buddha, and much prized by the Buddhists.

Jat'ropha, a genus of woody plants for the most part inhabiting the tropical parts of America. The roots of *J. manihot* yield manioc or cassava. *J. elastica* yields an elastic substance used as caoutchouc.

Játs (jäts), an Indian race occupying a large part of the Punjab and half of the Rajput states. They are a hardy, industrious, agricultural people, rearing large flocks of camels in the desert districts of Sind. Their religion varies with locality, and embraces Brahmanism, the Sikh tenets, and Mohammedanism.

Jaundice is not specifically a disease, but is rather the indication of bile-coloring matter in the blood, shown by a greenish-yellow color of the skin. This is caused either by disease of the liver, which prevents that organ from separating bile pigments from the blood, or is due to some obstruction in the bile ducts leading to the intestines. The yellow color first appears on the whiter parts of the body, as the eye, the neck, the chest, etc. Besides the milder, there is also a malignant form of jaundice which usually ends fatally.

Jaunpur (joun-pör'), a town of India, N. W. Provinces, on the river Gúmti, over which there is a fine bridge. It is an old town, and has some beautiful specimens of architecture. Pop. 44,845. The district has an area of 1,554 sq. mi.; pop. 1,209,663.

Java, an island in the Indian Archipelago, the chief of the Dutch colonial possessions; capital, Batavia. Area 48,830 sq. mi. Java and the smaller adjacent island of Madura are divided into twenty-two provinces. Population 1901, 26,128,053. Volcanic mountain chains running from east to west, and rising to such points as Semiru (12,250 ft.) and Slamat (11,320 ft.); low-lying marshy tracts in the north, with such safe land-locked harbors as Batavia and Surabya; in the south a rocky unbroken coast washed by the heavy surf of the Indian Ocean —these are its chief characteristics. The vegetation is varied. Rice is the chief cereal, but coffee and sugar are the staple products; spices are also grown, and some cotton is raised. Other products are cochineal, pepper, tobacco, tea. The forests consist mainly of teak. There are about 100 kinds of mammalia inhabiting Java. These include the one-horned rhinoceros, tiger, panther, tiger cat, wild hog, several kinds of deer, several monkeys (but not the orang-utan), and enormous bats. The ox, the buffalo, the goat, are among the domestic animals. Birds are numerous. The native population belong to the Malay race, and are brownish-yellow in complexion, with long, thick, black hair. They are sober, patient, and industrious, but quick to avenge affront. In religion they are nominally Mohammedan. The great mass are devoted to agriculture, living in villages each governed by a native chief. Most of the land belongs to the Dutch government, which obtains a large revenue from the island. The principal exports are coffee, sugar, tea (the production of which is constantly increasing), tin, rice, cinchona, indigo, spices,

tobacco, hides, and india rubber. Railways have been introduced, and telegraphic communication is developing rapidly. A governor general rules Java and the whole of the Dutch East Indies The history of Java is unknown previous to the eleventh century, when the Hindus founded a dynasty and converted the natives to Brahmanism. This was overthrown by an invasion of the Mohammedans in 1478. These were succeeded by the Portuguese, who arrived in 1511. They were followed by the Dutch in 1595, who wrested from them the supremacy.

Jay, a genus and sub-family of birds belonging to the family of the crows (Corvidæ). The jays have the upper mandible or bill notched or indented near its tip, and the feathers on the top of the head are erectile, and can be elevated at will, to form a kind of crest. These birds are readily domesticated, possess a harsh, grating note, and are admirable mimics. They feed on fruits, seeds, worms, insects, and the eggs and young of other birds, etc. The common or European Jay is the size

Common Jay.

of an ordinary pigeon, the general color is a light brown inclining to red, while the larger or primary wing feathers are of a brilliant blue, marked out by bands of black. The blue color reaches its highest brilliancy in the North American bluejay, which otherwise closely imitates its Europran representative both in size and habits. The bluejay is exceedingly well known in the U. S. Another American jay is the Canada jay or "whisky jack," a bird of rather somber coloring, but of the bold, noisy, and active habits of others of the jays.

Jay, John (1745–1829), American jurist and statesman. In 1766 he was admitted to the bar, and in 1774 was chosen a delegate to the first American Congress, which met at Philadelphia. He was a member of the second Congress, and in 1778 he was appointed minister plenipotentiary to Spain. In 1782 he was appointed one of the commissioners to negotiate a peace with Britain, and, along with Adams and Franklin, concluded a treaty with the British. Returning to the U. S. he was appointed secretary of State and afterward chief justice. In 1794 he was sent as envoy extraordinary to Great Britain, and concluded a treaty which has been called after his name, and by which $1,000,000 was given to Americans as compensation on account of the illegal captures by British vessels, the eastern boundary of Maine was fixed, etc.

Jebb, Richard Claverhouse (1841–), one of the first of living Greek scholars. He graduated as senior classic at Trinity College in 1862. In 1875 he was called to fill the Greek chair in Glasgow University, which he resigned in 1889 on being appointed Greek professor at Cambridge. His best-known works are, *The Attic Orators; Modern Greece; a Life of Richard Bentley; Homer: an Introduction to the Iliad and Odyssey;* and his admirable edition of *Sophocles* (as yet incomplete).

Jefferson, Joseph (1829–), comedian, b. in Philadelphia. His great-grandfather was a member of Garrick's company at Drury Lane, while his father and grandfather were well-known American actors. Jefferson was on the stage from his very infancy, appearing as Cora's child in *Pizarro* when only three years of age, and dancing as a miniature "Jim Crow" when only four. For many years he went through the hard training of a strolling actor, and then played in New York, where in 1857 he made a hit as Doctor Pangloss, and in 1858 created the part of Asa Trenchard in *Our American Cousin*, Sothern playing Lord Dundreary. In 1865 he visited London, and at the Adelphi Theater played for the first time his world-famous part of Rip Van Winkle The character is one of the most perfect works of art—beautiful in conception, subtle and delicate in execution. And the art is all the actor's; the dramatist has done nothing. Rip is a lazy, good-for-nothing vagabond, but Jefferson makes him "The Arcadian vagabond of the world of dreams." Pl. 6, Vol. I.

Jefferson, Thomas (1743–1826), the third president of the U. S., was born at Shadwell, in Albemarle co., Va. In 1769 he was elected a member of the provincial legislature, and in 1775 he took his seat for the first time in Congress. It was he who drew up the draft of the Declaration of Independence, which (in a slightly modified form) was signed on July 4, 1776. In 1779–81 he was governor of Virginia. In May, 1784, Congress elected him minister plenipotentiary to France, in addition to Adams and Franklin; next year he was appointed sole minister, and his residence in Europe lasted about five years. On his return he was appointed secretary of state by Washington, an office which he continued to fill until the end of 1793. In 1796 he was elected vice-president of the U. S.; but he was seldom consulted by the president, and he was out of harmony with the government. In 1800 he was elected president. In 1809 he retired to private life at his residence of Monticello, in Virginia, where he died on the fiftieth anniversary of the Declaration of Independence. Jefferson was the acknowledged head of the Republican party from the period of its organization. He published *Notes on Virginia*, various essays on political and philosophical

subjects, and a *Manual of Parliamentary Practise* for the use of the U. S. Senate. Pl. 22, Vol. III

Jefferson City, Cole co., Mo., on Missouri river, 125 m. w. of St. Louis; capital of the state. Railroads: Missouri Pacific, with several branches, and Chicago & Alton. Industries: shoe factories, flour mills, iron foundries, planing mills; and saddle trees, brooms and harness made at prison. The surrounding country is agricultural and mineral. The city is the seat of the state prison. Pop. 1900, 9,664.

Jeffersonville, Clark co., Ind., just opposite Louisville, Ky., on Ohio River. Railroads: P. C. & St. L., and Ohio & Mississippi. Industries: foundries, machine shops, railroad car works, shipyards, hollow-ware, oil, trunk, slat factories, etc. It is the seat of the Southern State Prison and the U. S. Quartermaster's supply depot. It is also the central point of army supplies for the entire country. Pop. 1900, 10,774.

Jeffreys, GEORGE (Baron Wem) (1648–1689), an infamous English judge, commonly known as *Judge Jeffreys.* Soon after commencing his professional career he was chosen recorder of London; and he was appointed, successively, a Welsh judge and chief justice of Chester, created a baronet in 1680, and latterly appointed chief justice of the King's Bench. He was one of the advisers and promoters of the arbitrary measures of James II; and for his sanguinary and inhuman proceedings against the adherents of Monmouth on the "bloody western circuit," was rewarded with the post of lord high chancellor (1685). On the arrival of the Prince of Orange, the chancellor, who had disguised himself as a seaman, was detected and carried before the lord mayor, who sent him to the lords in council, by whom he was committed to the Tower, where he died.

Jehosh'aphat, son of Asa, and fourth king of Judah, 915–890 B. C. He was noteworthy in his strenuous endeavors to abolish the use of idols. Jehoshaphat denotes "Jehovah's judgment."

Jeho'vah (Heb. *Yahveh*), the popular pronunciation of the sacred name of God among the Hebrews, represented in the text of the Old Testament by the four consonants J (or Y), H, V, H. The Hebrews cherished the most profound awe for this name, and this sentiment led them to avoid pronouncing it, and to substitute the word *Adonai,* which signifies *the lord,* which custom still prevails among the Jews. In some portions of the Pentateuch Jehovah is the name regularly applied to God, in others Elohim: this has led to a theory of two authors respectively for these portions.

Je'hu, the founder of the fifth dynasty of the kingdom of Israel. He was a commander in the army of Jehoram, when Elisha sent one of the "children of the prophets" to consecrate him king of Israel at Ramoth-Gilead (B.C. 895). He immediately attacked Jehoram, whom he slew in battle, and then entered upon a work of extermination in which were slain seventy of Ahab's children, forty-two brothers of Ahaziah, king of Judah, and Hezekiah himself, as also Jezebel. He died after a reign of twenty-eight years. His name occurs more than once on the monuments discovered at Nineveh.

Jelly, a name for such substances as are liquid when warm, but which coagulate into a gelatinous mass when cold. Animal jelly is prepared from the soft parts of animals, and even from bones when sufficiently crushed. It is a colorless, elastic, transparent substance without taste or smell, and which is soluble in warm water.

Jellyfishes, the popular name of certain animals, found in the sea, and often familiarly called sea blubbers and sea nettles, from their appearance and stinging property. When in the water they present a singularly beautiful appearance, one of the most common resembling a clear crystalline bell, which swims gracefully through the water by alternately expanding and contracting its body. They are very voracious, and move upon their prey (minute animals) with great rapidity, seizing it with their long stinging tentacles. The phosphorescence of the sea is to some extent explained by the pale light which they diffuse in the darkness.

Jena (yā'nā), a town of Germany, in the grand-duchy of Saxe Weimar, 12 mi. e. of Weimar, on the Saale, a place of little importance except for its university, which was opened in 1558. Pop. 12,017.

Jenner, EDWARD (1749–1823), an English physician, celebrated for having introduced the practise of vaccination as a preventive of the smallpox. He studied at London and afterward settled in Gloucestershire as a medical practitioner. About 1776 the belief common among the peasants that casual cowpox acquired in milking cows was a preventive of smallpox, caused him to direct his inquiries to the subject, and led to the introduction of the process of vaccination in 1796. His method at first met with great opposition from the medical profession, but was ultimately universally accepted both by his own and foreign nations.

Jephthah, one of the Hebrew judges, who defeated the Ammonites, but having rashly made a vow that if he was victorious he would sacrifice to God as a burnt-offering whatever should first come to meet him from his house, he was met on his return by his daughter, his only child, whom he sacrificed, in consequence, to the Lord.

Jer'boa, a genus of small animals belonging to the order Rodentia or Gnawers, having extremely long hind limbs, which give them an extraordinary power of leaping, so that their movement seems more like flying than running. The fore limbs are armed with short powerful claws, with which they excavate their burrows and extract the roots on which they chiefly live. They are gregarious and nocturnal in their habits, and hibernate during the colder seasons. The jerboas are found chiefly in Asia and Northern Africa. The typical species is the Egyptian form.

Jeremi'ah, the second of the great prophets of the Old Testament, flourished during the

darkest period of the kingdom of Judah, under Josiah, Jehoahaz, Jehoiakim, Jeconiah, and Zedékiah. He was called to the prophetic office about 629 B.C., in the reign of Josiah, and lived to see the capture of Jerusalem by Nebuchadnezzar in 586 B.C., who offered him a home at Babylon, but he preferred to stay among the wretched remnant of the people left in Judah. He is said to have been stoned to death in Egypt by some of his countrymen, who were irritated by his rebukes.

Jerez (or Xerez) (*he*-reth′) **de la Frontera,** a town of Southwestern Spain, in Andalusia, prov. of Cadiz, 16 mi. n.n.e. of Cadiz. It is noted for its wine, well known under the name of sherry, which is exported in large quantities. Pop. 57,000.

Jericho (jer′i-kō), a considerable town of ancient Judea, on a plain about 18 mi. n.e. of Jerusalem, noted, especially in Solomon's time, for its balsam gardens and its thickets of palm trees and roses, and carrying on a flourishing trade in balsam and spices. It was the key of Palestine, and was therefore invested by the Israelites who had passed the Jordan under Joshua to conquer this country. Its site is now occupied by the small village of Riha.

Jerboa.

Jerked Beef, from the Chilean word *charqui*, beef cut into strips of about an inch thick, and dried in the sun to preserve it. It is used in Chile and other parts of South America, and has been tried in Australia. When well prepared it will keep for a great length of time.

Jerkin head, in architecture, the end of a roof when it is formed into a shape intermediate between a gable and a hip, the gable rising about half way to the ridge, so as to have a truncated shape, and the roof being hipped or inclined backward from this level.

Jerobo′am, the name of two kings of Israel. JEROBOAM I, the son of Nebat, on Solomon's death (973 B.C.) was made king of the ten tribes who separated from Judah and Benjamin. He died in the 22d year of his reign. JEROBOAM II, the most prosperous of the kings of Israel, reigned 823–782 B.C. He repelled the Syrians, took their cities of Damascus and Hamath, and reconquered Ammon and Moab. But licentiousness and idolatry were prevalent during his reign.

Jerome, ST., (full name EUSEBIUS HIERONYMUS SOPHRONIUS) (?–420), one of the most learned fathers of the Latin Church, was b. sometime between 331 and 345 in Dalmatia, of wealthy parents. He was baptized in Rome, went in 373 to Antioch in Syria, and in 374 retired to the desert of Chalcis, where he passed four years in severe mortifications and laborious studies. He left his solitude to be ordained presbyter at Antioch, went to Constantinople to enjoy the instruction of Gregory of Nazianzen, and in 382 returned to Rome, where his expositions of the Holy Scriptures gained many adherents. His Latin version of the Old Testament from the original language was the foundation of the Vulgate. He took an active part in many controversies, notably those regarding the doctrines of Origen and Pelagius.

Jerome of Prague (1360–1416), a Bohemian reformer, in faith and sufferings the companion of the famous John Huss. Together they made a vigorous crusade against the dissoluteness of the clergy, the worship of relics, etc. When Huss was imprisoned in Constance Jerome hastened to his defense, but was seized and carried thither in chains (1415). After much suffering he consented to recant his heresies, but on being subjected to a new examination solemnly retracted his recantation, and made a vigorous vindication of the principles of Huss and Wickliffe. On May 30, 1416, he was burned at the stake, and his ashes thrown into the Rhine.

Jerome, JEROME K., English humorist, was b. at Walsall, Staffordshire, in 1861, and educated at the Philological School of Marylebone. He was successively actor, journalist, tutor, stenographer, and clerk until 1889, when he published, *Idle Thoughts of an Idle Fellow*, and became famous. He has also written several plays. In 1893 he became proprietor of the weekly magazine, *To-day*. Among his other books may be mentioned, *Three Men in a Boat*, and *John Ingerfield, and Other Stories*.

Jer′sey, the largest and most valuable of the Channel Islands, about 15 mi. off the n.w. coast of France; area 44.87 sq. mi. The climate is peculiarly mild and agreeable. Wheat is the principal cereal raised, and large quantities of grapes, peaches, melons, pears, and other fruits are exported, as also vegetables, and especially early potatoes for the London market. Cows of the famous Jersey or Alderney breed are reared and exported in great numbers. Principal town, St. Helier. Pop. 52,455.

Jerseyville, Jersey co., Ill., 50 mi. n.w. of St. Louis. Railroads: C. & A.; and C. St. P. & St. L. (bluff line). Industries: car shops, two flouring mills, machine shops, agricultural works, and four cigar factories. Rich coal field s.e. of city. Surrounding country agricultural. The town was first settled in 1834, and was known as Hickory Grove, and became a city in 1867. Pop. 1900, 3,517.

Jersey City, Hudson co., N. J., in the n.e. part of the state, connected with New York

City by various ferries. Railroads: Central N. J., and nine others. Industries: locomotive and railroad supply works, steel, foundry, and machine shops, crucible, glass, zinc, chemicals, jewelry, fireworks, lead pencils, chains, rubber goods, castor, copper ware, grain elevators, and sugar refineries. Foreign and domestic commerce in iron, coal, produce, and general merchandise is very extensive. There are large stock yards in the vicinity, also an extensive and well appointed abattoir. The site of Jersey City was formerly called Paulus Hook, but in 1820 it was chartered as the City of Jersey and in 1838 as Jersey City. Pop. 1900, 206,433.

Jerusalem (Ar. *El-Kuds*, "The Holy"), one of the most ancient and interesting cities in the world, in Palestine, in the Turkish province of Syria. It stands on an elevated site (about 2,500 ft. above the sea) within the fork of two ravines, the Valley of Jehoshaphat on the east, and the Valley of Hinnom on the south and west, while a third ravine or valley—Tyropœon—partially traverses it from south to north. On the east side of this valley is Mount Moriah, now the Mohammedan quarter of the city, where anciently stood the palace and temple of Solomon. Immediately south of this stood the mountain fortress of Zion, known as the City of David, and later as the Akra, or Lower City. This part of the city is now waste. According to another view, however, the "City of David" is the Upper City on the opposite or western side of the Tyropœon Valley, and to this the name of Zion is given by current tradition. This part is where the quarter of the Armenians, the citadel, and the Protestant church now are. Of the three walls which Jerusalem latterly possessed, the first wall, that of David, was for the defense of this Upper City (the traditional, but probably not the ancient Zion). The second wall took in a considerable area on the east and northeast, while a new town or suburb, Bezetha, which grew up on the north of this, was enclosed by a third wall, built by Agrippa I. The present limits are much the same as those indicated by the third wall, only that the Lower City and the southern part of the old Upper City are unpopulated places outside the modern walls. Of the seven gates only five are now used. The interior of the city is much occupied by mosques, churches, and convents. In the northwest quarter is the Church of the Holy Sepulcher, so called because alleged to contain under its roof the very grave in which the Saviour lay. A large area in the east of the city is occupied by the enclosure known as El Haram-Esh-Sherif (The Noble Sanctuary), which is in the form of a regular parallelogram, surrounded on all sides by a lofty wall. The most conspicuous building within is the Mosque of Omar, called also Kubbet-es-Sakhrah (Dome of the Rock), a splendid structure of octagonal form which occupies the site of the Jewish Temple. Among the notable convents are the Latin convent, and the still more extensive Armenian convent, capable of accommodating 1,000 pilgrims. Within the last twenty years or so a considerable improvement has taken place in the appearance of the city, as well as of the surrounding country. The population is 42,500, of whom 8,250 are Christians, and 20,000, Jews. The first railway to Jerusalem was opened in 1893.

Jerusalem is not mentioned by name till about B.C. 1500, when it was in the hands of the Jebusites. The lower part was wrested from them by Joshua, but the upper part continued in their possession till the time of David, who took up his residence in the stronghold of Zion, and made Jerusalem the capital of his kingdom. It reached the height of its glory under Solomon, after whose time it declined. In 586 Nebuchadnezzar took and destroyed the city after a long siege, and carried off those of the inhabitants whom the sword had spared as captives to Babylon. On the return from the captivity the temple was rebuilt, B.C. 515. The walls were not rebuilt till the time of Ezra and Nehemiah, 455 B.C. The city had regained a considerable degree of prosperity, when it was sacked and its walls leveled by Antiochus of Syria in 168. Under the Maccabees Jerusalem, in common with Judea, became once more independent, 165 B.C. It next became tributary to Rome, and had been greatly beautified and enriched with a fine new temple by Herod when the Saviour appeared. In A.D. 66 Jerusalem was taken by a party of Jews who had revolted against Rome. Titus, the son of the emperor Vespasian, regained it in the year 70, after a terrible siege; the temple was burned, and the city razed to the ground. In 131 Hadrian ordered the city to be rebuilt, but it continued depressed till the beginning of the fourth century, when, Rome having become Christian, Jerusalem shared in the benefit, and assumed the appearance of a distinguished Christian city, under the fostering care of Helena, mother of Constantine the Great. This period of prosperity, prolonged by a succession of Christian emperors, was suddenly terminated in 636, by the conquest of the Mohammedans, under the Arabian Caliph Omar. In 1099 the Crusaders took Jerusalem by storm, and made it the capital of a Christian monarchy, which with difficulty maintained its existence till 1187, when it was finally overthrown by Saladin. In 1517 Jerusalem fell into the hands of the Turks, and has remained to this day a part of the Ottoman Empire.

Jester (or Court Fool), a buffoon or person maintained by the noble and wealthy to make sport by jests and merry conceits for them and their friends. The professional jesters usually wore a motley or party-colored dress, and a cap or cowl of gay colors furnished with bells and asses' ears, or crowned with a cock's comb.

Jesuit Porcelain, a name given to Japanese porcelain of the sixteenth century, which the Jesuits had caused to be decorated with Madonnas, images of the saints, and Christian emblems. It is now rare.

Jes'uits (or Society of Jesus), the most celebrated of all the Roman Catholic religious orders, founded in the sixteenth century by Ig

natius Loyola, and established by a papal bull in 1540, the founder being the first general of the order. The members, in addition to the usual vows of poverty, chastity, and implicit obedience to their superiors, were bound by a fourth, viz., to go whithersoever the pope should send them, as missionaries for the conversion of infidels and heretics, or for the service of the church in any other way. The popes Paul III and Julius III, seeing what a support they might have in the Jesuits against the Reformation, granted to them privileges such as no body of men, in church or state, had ever before obtained. They were permitted to enjoy all the rights of the mendicant and secular orders; to be exempt from all episcopal and civil jurisdiction and taxes, so that they acknowledged no authority but that of the pope and the superiors of their order; to exercise every priestly function, parochial rights notwithstanding, among all classes of men, even during an interdict; and they could absolve from all sins and ecclesiastical penalties, dispense themselves from the observance of fasts and prohibition of meats, and even from the use of the breviary. Their general was invested with unlimited power over the members, the dispersion of whom throughout society, with the most entire union and subordination, was made the basis of the order. The constitution of the body was drawn up in great part by Loyola himself, but the second general, Laynez, had much to do in directing its early movements.

The order soon approved itself to the pope by its zealous activity, and its success as the most effectual barrier against the growing power of Protestantism. The Jesuits carefully avoided all appearance of spiritual pride, often wore the ordinary garb of the country, and generally dealt with all matters in a spirit of worldly policy and accommodation to circumstances. In Europe they became the teachers of the higher classes, and carried out on a grand scale improvements in the current system of instruction. The young nobility were almost exclusively sent to them, and even from Protestant countries. At an early date the Jesuits began to send missionaries to heathen nations. The greatest of these was St. Francis Xavier, called from the scene of his first labors the "Apostle of the Indies." He was a close friend of Ignatius Loyola and one of the first members of the Jesuit Order. In 1542 he began his great work in India. He was not only the means of converting thousands to Christianity but had a supreme faculty for organization and formed his converts into communities under the care of competent native catechists. His work in Japan was no less marvelous. It is a fine testimony to the thoroughness of his teaching that during the 300 years when a profession of Christianity was punished by death, the doctrines and practices received from Xavier were handed down secretly from father to son. Thus, when the French missionaries again entered Japan in 1860 they found over 30,000 Japanese Christians there.

The story of the work of the Jesuit missionaries in America is most thrilling. Many of them are famous as discoverers. Father Joques discovered Lake George, to which he gave the name of Lac du St. Sacrement. Marquette discovered the Mississippi and explored it as far as the mouth of the Arkansas. His diary and maps of the discovery of the Mississippi decided the controversy between France and England about the possession of the western territory. Other Jesuits reached the Pacific coast and established the missions of California. The records of those early days abound in stories of the courage and self-sacrifice of these Christian missionaries among the Indians. Some of them suffered martyrdom. Father Joques was cruelly tortured and slain on the banks of the Mohawk in 1646; a few years later Garnier, Daniel and others were shot and De Brébeuf and Lallement were burned at the stake. All endured privations and suffering with fortitude and met death calmly. The record, or *Relations*, of the French missions have been published recently in America, forming 72 volumes of valuable historical matter. Members of the English and Spanish Orders also came to America at an early date and many of their records have also been preserved.

Wherever the Jesuits went they were considered as the special upholders of the Papacy and the most faithful defenders of the Catholic Church. From this fact and from their courage in living in the midst of their enemies and their skill in evading detection, they were in certain countries at various times, regarded with suspicion and accused of deeds of which subsequent investigations have proved them innocent. The perpetuation of these calumnies is due chiefly to the misrepresentations of historical romance. Even in Catholic countries, especially France, their close adhesion to the Pope often made their position insecure. Finally in 1764, the united efforts of their enemies in France brought about their suppression by royal edict throughout the French dominions. This example was followed within a few years by the other Bourbon courts—Spain, Naples, Parma and Modena. In 1773 Pope Clement XIV issued the brief *Dominus ac Redemptor Noster*, by which without entering in any way into the justice of the charges made against the Jesuits, but acting solely on the motive of "the peace of the Church," he suppressed the Society in all the States of Christendom. In all the Catholic countries, except Spain and Portugal, the members were, however, allowed to remain and as individuals wisely continued their ministerial or literary work. Frederick the Great of Prussia and Catherine II of Russia refused to allow the brief of suppression to be published in their dominions because of the high esteem in which the Jesuits were held as educators in those countries.

In 1800 Pope Pius VII permitted the formal re-establishment of the Jesuits in Lithuania and White Russia and in 1804 in Naples. In 1814 by the bull *Solicitudo Omnium Ecclesiarum*, the re-establishment of the Order in all Christendom was completed.

Since then the Society of Jesus has flourished in all parts of the world. It is the most zealous of all missionary bodies of the Church and has over 3,000 priests in heathen lands. They are foremost too in the work of education. Their preparation for this work is the best in the world. A seven years' course of study, embracing the humanities, philosophy and science, must be completed by each candidate for orders. He is then sent to teach in a Jesuit college for five years. During this time he is not confined to one class, but is advanced each year with his pupils, thus providing for his own mental development as well as the consistent progress of his pupils. The Jesuit system of education was completed in 1599 under Acquiviva, the fifth general of the Society. At the time of his death in 1615 the Society had 272 colleges. By the middle of the eighteenth century there were 728 colleges with about 300,000 students. Notwithstanding the losses sustained during the period of suppression, in the year 1900 the Jesuits had more than 60,000 students in their colleges. In the United States they have colleges in New York, Baltimore, Boston, Worcester (Mass.), Washington, Georgetown, (D. C.), Jersey City, Fordham (N. Y.), Cleveland, Cincinnati, Buffalo, Detroit, Milwaukee, Chicago, Omaha, St. Louis, Galveston, Mobile, New Orleans, St. Mary's (Kansas), Denver, San Francisco, Santa Clara (Cal.), and Spokane.

Jesus Christ, the founder of the Christian religion; b. in Bethlehem according to the received chronology in the year of Rome 754, but in reality some four years earlier, that is, in 4 B.C. He was born of the Virgin Mary, of the tribe of Judah, who was betrothed to Joseph, by occupation a carpenter. Two genealogies of Joseph differing very much after the time of David are given, one by Matthew, chap. 1; the other by Luke, chap. 4. Our information concerning him is derived almost entirely from the accounts of his life written by the four evangelists, Matthew, Mark, Luke, and John, and incidental notices in other parts of the New Testament. Before the birth of the Holy Child, Joseph and Mary, then residing in Nazareth, went to Bethlehem to be taxed, and it was there, in a manger, the inn being full, that Jesus was born. On the night of his birth an angel announced the coming of a Saviour to shepherds tending their flocks by night in the field. On the eighth day he was circumcised according to the law of Moses. Soon after his birth he was hailed by the adoration of the Magi, or wise men of the East, who were miraculously directed to the house where the young child was, and presented royal gifts. Herod, alarmed at hearing of the birth of one who was to be King of the Jews, determined to destroy all the male children of Bethlehem and its vicinity of the age of less than two years, for the purpose of effecting the death of Jesus. But Joseph, being miraculously warned of the danger, fled to Egypt with the virgin and her child, and on his return, after the death of Herod, went to reside at Nazareth in Galilee, whence Jesus was often called a Nazarene. We have no further accounts of Jesus till his twelfth year, when his parents took him with them to Jerusalem. Here after being lost for three days he was found in the temple sitting among the doctors hearing them and asking them questions. Regarding the following eighteen years of his life the evangelists are silent. He probably during this period followed his occupation as a carpenter. At the age of about thirty he appeared as a public teacher, having been baptized in the Jordan by John, who recognized him as the Messiah. He then retired to the wilderness, where he passed forty days in fasting, meditation, and prayer previous to being tempted of the devil as described by the evangelists. He then began to select his disciples, to teach publicly, and perform miracles. Among the notable incidents of his public career are, the changing water into wine at the marriage in Cana of Galilee (his first miracle); the driving of the traders out of the temple during the feast of the passover; the curing by a word a nobleman's son lying ill at Capernaum: his scornful reception as a preacher in the city of Nazareth on account of his humble parentage; the calling of the twelve apostles; the sermon on the mount; the healing of the centurion's servant, and the restoration of the widow's son at Nain to life; the healing of the man at the pool of Bethesda; the miraculous feeding of 5,000 persons with five loaves and two fishes; the calming of the tempest on the lake of Gennesaret; his healing the Syrophenician woman's daughter of an unclean spirit; the transfiguration on the mountain; the raising of Lazarus at Bethany; the cure of blind Bartimæus at Jericho; the entry with triumph into Jerusalem; the fourth feast of the passover with his disciples, known as the Last Supper; the agony in the garden of Gethsemane; the betrayal and the condemnation before the sanhedrim; the trial before Pilate, and the crucifixion on Golgotha or Mount Calvary. The body of Jesus was taken down from the cross by Joseph of Arimathea, and placed in a tomb about which the Jewish priests set a guard. But on the third day, i.e., on the third day thence called the Lord's day and made first day of the week, he rose from the dead, appeared to his disciples and others, and on the fortieth day after his resurrection, while with his disciples on the Mount of Olives, was visibly taken up into heaven. These events of his public life occupied about three years.

Jet, a solid, dry, black, inflammable fossil substance, harder than asphalt, susceptible of a good polish, and glossy in its fracture, which is conchoidal or undulating. In Great Britain it is found chiefly at Whitby in beds of the Upper Lias shale. It is the altered fossilized wood of coniferous trees. It is wrought into buttons and personal ornaments of various kinds.

Jetty, a kind of pier or artificial projection of stone, brick, wood, or other material, affording a convenient place for landing from and discharging vessels or boats, or serving as a protection from the violence of the waves; or

a jetty may be built out from the bank of a stream obliquely to its course, and employed either to direct a current on an obstruction to be removed, as a bed of sand or gravel, or to deflect it from the bank which it tends to undermine or otherwise injure. In this last sense jetties have been successfully used to deepen river mouths or retard the advance of a bar.

Jev'ons, WILLIAM STANLEY (1835–1882), an English writer on logic and political economy, b. at Liverpool. He was educated at University College, London; held an appointment in the royal mint in Australia from 1854 to 1859; graduated at London University in 1862; was appointed professor of logic, mental and moral philosophy, and Cobden lecturer on political economy in Owens College, Manchester, afterward professor of political economy in University College, London, a post which he resigned in 1881. Among his works are *Elementary Treatise on Logic* (1870), *Theory of Political Economy* (1871), *Principles of Science* (1874), and many essays and addresses on economic questions. Those entitled the *Coal Question*, the *Value of Gold, Money*, and the *Mechanism of Exchange*, may be specially mentioned. He was drowned while bathing.

Jew, THE WANDERING, a legendary personage regarding whom there are several traditions. One of the most common is that he was a cobbler in Jerusalem by name Ahasuerus, at whose house Jesus, overcome with the weight of the cross, stopped to rest, but who drove him away with curses. Jesus is said to have replied, "Truly, I go away and that quickly; but tarry thou till I come." Since then, driven by fear and remorse, the Jew has wandered, according to the command of the Lord, from place to place, and has never yet been able to find a grave.

Jew'elry. This term comprises the setting of precious stones, and also the manufacture of small ornamental works in gold, silver, mixed metals, amber, coral, and other materials. The use of personal ornaments dates from the earliest periods of which we have any knowledge, and it characterizes every variety of the human race, whether civilized or savage. It is probable that the wearing of gold and silver ornaments immediately followed the discovery of those metals. Probably gold, from the form in which it is usually found and the beauty of its color, was the first to be used in this way, and also from its ductility and capacity of receiving polish, the first to invite artistic skill in its working. Gold ornaments, displaying a high degree of skill in their manufacture, have been recovered from the ruins of Mycenæ and Hissarlik, and from the tombs of ancient Egypt. The gold work of ancient Egypt, though executed nearly 3,000 years ago, is of the highest quality, and in many points of excellence it would be impossible to surpass it by the most improved methods of modern times. Many beautiful specimens of the work of the ancient Greek and Roman jewelers are preserved in the museums of Europe, and a large number of very interesting specimens have been obtained from the tombs of Etruria. Some of the gold work displayed in the Etruscan ornaments remained, until a recent period, a complete puzzle to the jewelers of Europe. The method by which the curious granulation of surface was obtained was, however, found to be known to certain gold workers in the Abruzzi, where the secret had been preserved from a remote period, and through them it has been made known to the modern artificers of Italy. At the present day the Oriental jewelers preserve the same primitive methods of working that prevailed centuries ago. Their great manual dexterity and fine sense of color and beauty, however, enable them to obtain by simple means some very excellent results, and the work they produce, though unequal in finish to that of European workmen, is generally perfect in design and combination. New York is the chief center of the jewelry trade of the U. S. In Europe the great centers for the production of jewelry are to be found in the cities of Paris, Vienna, London, and Birmingham.

Jew-fish, the name given to two species of large fishes well known in American waters. The one, known also as the guasa or black grouper, sometimes reaches the weight of seven hundred pounds; the other inhabits particularly the Californian coast, often weighs five hundred pounds, and has flesh of excellent quality.

Jews, a Semitic race of people also known as Hebrews and Israelites, and whose early history is identified with that of Palestine or the Holy Land. Jewish history may be considered as beginning with the emigration of the patriarch Abraham, ancestor of the race, from Ur of the Chaldees, probably about 2000 B. C. Abraham removed to the southeast of Palestine, where we find his descendants flourishing when they were led to emigrate to Goshen, in Egypt. The interval is filled up with the history of the patriarchs, Abraham, Isaac, and Jacob (which see). Joseph, a son of Jacob, had become viceroy of Egypt, and his father and brothers were received with high favor by the Pharaoh who then ruled in this country. But in course of time the condition of the Israelites, under the rule of the Pharaohs, changed for the worse. They were treated as bondmen, and forced labor exacted of them in an unreasonable degree. According to some authorities the Pharaoh who began to oppress the Israelites was Rameses II, and their deliverance took place under his son. It was perhaps about 1320 B. C., others say 1491 B. C., that a deliverer in the person of Moses led the Israelites out of the land of bondage, where they resided for some 400 years. By this time they formed a community of several millions, divided into twelve tribes. Under his leadership they went forth into the wilderness; through him they received the law of the ten commandments on Mount Sinai, and the whole polity by which they were to be governed as a people. A ceremonial of sacrifice was instituted, and Aaron, the elder brother of Moses, and his sons consecrated as a hereditary priesthood, the priestly func-

tions thus falling to the tribe of Levi. The nation was established as a theocracy, and this principle, however often forgotten in times of repose, continued henceforward to be the inspiring idea of national unity throughout the frequent crises of Jewish history. The emigrants first settled at Kadesh on the southern borders of Palestine, where they remained for many years, this being the period spoken of in the Scriptures as the forty years' wandering in the wilderness. They now marched northward to find new settlements in Palestine, which they had to wrest by force from the Canaanites. Moses died before entering the promised land, and was succeeded as leader by Joshua, under whom the Israelites advanced to the conquest of the territories of the Canaanites west of Jordan. The former inhabitants, however, were not entirely subjugated, but retained possession of a number of cities, and the twelve tribes settled in districts which were more or less cut off from one another, and which formed an exceedingly loose union of small states under tribal chiefs, at times hard pressed by neighboring people.

After the death of Joshua, about 1220, or according to another chronology 1427 B. C., a succession of judges or military leaders arose. About 1070 the Philistines, who inhabited the coast and the low-lying plains west of the mountains of Judah, had defeated the Israelites and subjugated part of the country when Samuel, "the last judge in Israel," was inspired to declare to Saul, a Benjamite, his destiny to become king, and anointed him as such. Saul soon proved his fitness for the post by his successful leadership of the Israelites, and he continued to organize the forces of Israel, and to fight with varying success against their enemies till his disastrous defeat and death at Mount Gilboa, after which the power of the Philistines again predominated on the west side of Jordan. On the other side of the river the military skill of Abner still preserved a kingdom for Saul's son, Ishbosheth, and gradually reasserted with some success his authority in Ephraim and Benjamin. But in Judah David, a native of Bethlehem, a warrior whom Saul's jealousy had driven into exile and alliance with the Philistines, and who had previously been anointed king in place of Saul, established a separate principality, the capital of which was at Hebron. For seven years a hot war was waged between the two Hebrew states, and ended only with the murder of Abner and Ishbosheth, all the tribes acknowledging David as king. David now transferred his residence from Hebron to Jebus, a fortified city which he wrested from the Canaanites, and called the city of David, afterward Jerusalem. He assailed and subdued the Philistines, Moabites, Edomites, Ammonites, and other surrounding nations, till all the country from the northeast end of the Red Sea to Damascus acknowledged his authority. To this prosperous kingdom succeeded his son Solomon (B. C. 993, or by the long chronology 1015). His reign, owing to the warlike reputation which the nation had acquired under David, was entirely peaceful. He had no military tendencies, but he took great pains to arrange the administration of the kingdom in an orderly way, and his wisdom as a ruler and judge became proverbial. His alliances with Tyre and Egypt enabled him to carry on an extensive and lucrative commerce. He built the celebrated temple in Jerusalem, and extended and improved the city.

The splendor of Solomon's reign had entailed heavy exactions upon his people. When Rehoboam, Solomon's son, succeeded, they came with Jeroboam at their head and demanded that he should make their yoke lighter. Rehoboam answered scornfully, whereupon ten tribes revolted and set up Jeroboam as king of a separate kingdom of Israel, with its capital first at Sichem, later at Samaria. Judah, along with a part of Benjamin and the tribe of the Levites, remained loyal to the dynasty of David. After an unsuccessful attempt to reconquer the kingdom of Israel, Rehoboam was forced by an invasion of Shishak of Egypt to give up the hope of uniting the two kingdoms. In the next generation things had changed so much that Asa, king of Judah, was obliged to seek the help of Benhadad of Syria against King Baasha of Israel. Baasha was succeeded by Elah, Elah by Zimri, and Zimri by Omri, under whom the kingdom of Israel seems to have grown powerful. Omri established the capital of the kingdom at Samaria (about 906 B. C.), and subjugated the Moabites. The son of Omri, Ahab, married Jezebel, princess of Tyre, an event which led to the extension of Phœnician idolatry in Israel. As Solomon had done before, Ahab built a temple for the Syrian Baal in his capital. In his reign and subsequently the great prophets Elijah and Elisha played an important part. Ahab was slain at Ramoth-Gilead in battle against the Syrians. He was succeeded by Ahaziah (853–851), and Joram (851–843). The latter was slain by Jehu, a captain of the army, who had been anointed king by command of Elisha. Jehu (843–815) now made a clearance in Samaria of Syrian idolatries, destroying the temple of Baal and putting the priests to death. Under Jeroboam II, fourth in the line of Jehu, the kingdom reached a high point of prosperity (790–749). After Jeroboam's death there was a quick succession of kings, Zachariah, Shallum, Menahem, Pekahiah, Pekah; none of any significance. Under Pekah the kingdom of Israel became tributary to the Assyrians. Hosea, Pekah's successor, made an ineffectual attempt to free the country from the Assyrian yoke; but finally, in 722, Samaria was captured by the Assyrian king, Sargon, the kingdom of Israel virtually destroyed, and the chief inhabitants carried away and settled in Assyria and Media.

Generally while the kingdom of Israel had been flourishing, that of Judah had stood in the background. Rehoboam was succeeded by Abijam, Asa, Jehoshaphat, the last a powerful and fortunate king. In the hope of putting an end to the war with the kingdom of Israel, Jehoshaphat married his son Jehoram (848–844)

to Athaliah, the daughter of Ahab of Israel. After the murder of her son Ahaziah by Jehu, Athaliah seized the supreme power in Jerusalem, and put to death her own grandchildren in order to destroy the line of David, Joash alone being miraculously rescued. Athaliah was overthrown and put to death and the young Joash raised to the throne (837–797). Under Ahaz and Hezekiah Isaiah delivered his sublime prophecies. Hezekiah was one of the greatest reforming kings; his influence extended widely over the kingdom of Israel, now in extreme decline. He was miraculously delivered from an invasion of Sennacherib, king of Assyria, by the destruction of the Assyrian army. Josiah (641–610) was the last of the pious kings of Judah. He was killed in battle against Necho, king of Egypt. After him there was an uninterrupted succession of weak and incapable monarchs, till under Zedekiah (599–588) the capture of Jerusalem by Nebuchadnezzar (B. C. 588) put an end to the monarchy, Jerusalem being destroyed and many of the people being carried captive to Babylon. The prophet Jeremiah flourished from the reign of Josiah to the captivity.

In 538 Babylon was taken by Cyrus, king of Persia, who restored the Jews and appointed Zerubbabel governor of Judea as a Persian province. The great majority of the Jews remained in Persia, however, only about 42,000 returned, and settled chiefly in the vicinity of Jerusalem. About 458 a second return of exiles was led from Persia by Ezra. Along with Nehemiah, who had been appointed Persian governor of Judea, Ezra promulgated the new law book, practically identical with the Pentateuch. From the time of Nehemiah to the fall of the Persian Empire the Jews continued to live in peace as Persian subjects, but enjoying their own institutions. When Alexander the Great overthrew the Persian Empire the Jews readily submitted on being promised the free exercise of their religion (B.C. 332). After the division of Alexander's empire Palestine was long a possession of the Ptolemies of Egypt, under whom it enjoyed a period of tranquillity. It was under the patronage of Ptolemy (II) Philadelphus (reigned B.C. 285–248), according to tradition, that the Septuagint or Greek version of the Old Testament Scriptures was made. After the death of Ptolemy, Philopator Antiochus the Great of Syria became master of Palestine (B.C. 198). An Egyptian and a Syrian party now arose among the Jews, and gave occasion to civil dissensions, which led Antiochus IV (Epiphanes) to invade Judea (B.C. 170), when he took Jerusalem by storm and slaughtered the inhabitants without distinction of age or sex, and endeavored to compel the Jews to give up their religion. At length under the leadership of the Maccabees or Asmonæan family resistance arose, and after a struggle of nearly fourteen years was successful. In 135 B. C. John Hyrcanus, son of Simon, a brother of Judas Maccabæus, completed the independence of Judea, and extended his dominion over the ancient limits of the Holy Land. During his reign the rival sects of the Pharisees and Sadducees became established. Aristobulus I, the son of Hyrcanus, assumed the title of king, which was held by his successors. In B. C. 63 Pompey, called in to help the Pharisees, took Jerusalem, and made the Jews tributary to the Romans. Latterly Herod the Great, who entirely threw off Jewish manners and cultivated the favor of the Romans, was recognized as king of Judea by the Roman senate. It was in B.C. 4, the last year of his reign, that the birth of Christ took place at Bethlehem. In 6 A.D. Judea and Samaria became a Roman province under a procurator, who had his seat at Cæsarea, and was subordinate to the prefect of Syria. Pontius Pilate, under whom our Lord's public ministry and crucifixion occurred, was made procurator A.D. 26. For a time the country was again ruled by a king, Herod Agrippa, A.D. 41–44. He persecuted the Christians and put the Apostle James to death. In A.D. 65 a party of the Jews revolted from the Roman yoke and roused the whole of Palestine to insurrection. Vespasian was sent by Nero to suppress it, but before the war was finished was called to the empire and left his son Titus to conclude it. The result was the capture and destruction of Jerusalem, A.D. 70, an event that deprived the Jews of the center of unity to which their national life had hitherto clung. After an insurrection headed by Bar-Cochba, (132–135) Hadrian razed the remains of Jerusalem left by Titus to the ground, and erected in their place a Gentile city, with the title Ælia Capitolina. Jews were forbidden to enter this city on pain of death, and the name of Jerusalem was not revived till the time of Constantine.

Henceforth the Jews became more and more a scattered people, without a country they could call their own. Under the Roman emperors their treatment varied. Under the Emperor Julian they ventured to make preparations for a new temple in Jerusalem. Although this attempt failed, they derived great advantages from their sanhedrim, revived at Tiberias, and their patriarchates (presidencies of the sanhedrim), which were established—one at Tiberias for the Western Jews (429); the other for the Jews beyond the Euphrates, latterly at Bagdad. These two patriarchates became points of union, and flourishing Jewish academies arose in the East to serve as seminaries for their learned rabbins. One of the works of these scholars was the collection of the traditionary expositions of the Old Testament, and additions to it, which was completed A. D. 500, and received, under the name of the Talmud, as a rule of faith by the scattered communities of Jews. In time the scattered Jews made themselves masters of the commerce of the Old World, and, as money lenders and brokers, were often of great importance to princes and nobles. Even during the dreadful persecutions which they underwent from the cruelty of the Christians they still continued prosperous in Christian countries. They lived more happily, however, among the Mohammedans, although they were distinguished by

dishonorable badges and oppressed by heavy taxes; and during the Moorish supremacy in Spain their prosperity was great and their learning flourishing. In the cities of France, Germany, and Italy, after the eleventh century, particular streets and enclosed places were assigned to them as a sort of outcasts, in consequence of which, in the persecutions during the Crusades, thousands often fell victims at once to the popular fury. They were generally pronounced incapable of civil rights and public offices. In Spain and Portugal during the fifteenth century they yielded to force, and multitudes suffered themselves to be baptized, many were put to death by the Inquisition, and at last they were banished from the peninsula. It was only in the end of the last century that the Jews began to be put on a level with other citizens, France leading the way after the Revolution, and Prussia following (1811). After repeated unsuccessful attempts to procure their admission into the British Parliament, the object was at last effected in 1858. The most remarkable circumstances connected with the modern Jews is the tenacity with which they cling to their ancient religion, and the purity in which on the whole they have retained their racial characteristics in the midst of alien peoples. In modern times they have produced some of the greatest names in letters and arts, as Spinoza, Moses Mendelssohn, Heinrich Heine, Meyerbeer, etc. The total number of Jews throughout the world is estimated at 8,000,000, the greater number being in Russia and Austria-Hungary.

Jews'-harp, a toy musical instrument held between the teeth, which gives a sound by the motion of a tongue of steel, which, being struck by the hand, plays against the breath. Called also *Jews' Trump*, or simply *Trump*.

Jhang town of Hindustan, in the Punjab, about 3 mi. from the Chenab. Pop. (with adjoining Maghiana), 21,629. Jhang district has an area of 5,702 sq. mi.; pop. 395,296.

Jhansi (jhän'sē), a fortified town in Hindustan, in Gwalior state, Central India Agency; pleasantly situated amid tanks and groves of fine timber trees. Within the town stands the fort on a rock. Pop. 26,772.

Jhelum (Jhilam) (jhā'lam, jhē'lam) (anciently *Hydaspes*), a river of India, the most westerly of the five great rivers that intersect the Punjab. Course 450 mi. There is a town of same name on the right bank of the river, with military cantonments. Pop. 21,107.

Jiddah (or Jeddah), one of the chief trading ports of Arabia, on the Red Sea, 60 mi. w. of Mecca, of which it is the port. It has a considerable trade, and thousands of pilgrims arrive here annually on the way to Mecca. Pop. about 18,000.

Jinn (Jinnee), being the singular, in Mohammedan mythology, a race of genii, angels, or demons, fabled to have been created several thousand years before Adam. They are not immortal; they are to survive mankind, but to die before the general resurrection. Some are good and obedient to the will of God; others are disobedient and malignant. They can assume the shape of the lower animals, and are visible or invisible as they please. Their chief residence is the mountain Kâf in Arabia.

Jit'omir, a town of Russia, capital of the government of Volhynia, on the left bank of the Teterew, 80 mi. w. of Kiev. Pop. 55,875.

Joan of Arc (1409–1431) (*Jeanne d' Arc*—properly *Darc*), the Maid of Orleans, a heroine in French and English history, was b. in the village of Dŏmrémy, Basse Lorraine, now department of the Vosges. While she was still a girl she began to be deeply affected by the woes of her country, much of which was conquered by the English, leaving only a small portion to the French king, Charles VII. In 1427 Orleans was being besieged by the English, and its fall would have ruined the cause of Charles. At this time Joan, who had been noted for her solitary meditations and pious enthusiasm, began, as she declared, to see visions and hear angelic voices, which ultimately called upon her to take up arms for Charles, to raise the siege of Orleans, and conduct Charles to Rheims to be crowned. At first she was regarded as insane, but eventually she found her way to the king and his councillors, and having persuaded them of her sincerity, received permission to hasten with Dunois to the deliverance of Orleans. In a male dress, fully armed, she bore the sword and the sacred banner, as the signal of victory, at the head of the army. The first enterprise was successful. With 10,000 men she marched from Blois, and April 29, 1429, entered Orleans with supplies. By bold sallies, to which she animated the besieged, the English were forced from their intrenchments, and Suffolk abandoned the siege (May 8, 1429). Other successes followed; Charles entered Rheims in triumph; and at the anointing and coronation of the king, July 17, Joan stood at his side. She was wounded in the attack on Paris, where Bedford repulsed the French troops, but continued to take part in the war till May 25, 1430, when she was taken prisoner by the Burgundians, and sold to the English. She was taken to Rouen, and after a long trial, accompanied with many shameful circumstances, condemned to death by the church as a sorceress. On submitting to the church, however, and declaring her revelations to be the work of Satan, her punishment was commuted to perpetual imprisonment. But pretexts were soon found to treat her as a relapsed criminal, and as such she was burned at Rouen, and her ashes were thrown into the Seine. She died with undaunted fortitude. Five years after, a court specially constituted by Pope Calixtus III to examine the charges against Joan of Arc, pronounced her innocent. Pl. 21, Vol. III.

Job, the hero of an ancient Hebrew poem, which forms one of the books of the Old Testament. Job, an upright man with a family of seven sons and three daughters, with large herds and numerous servants, is suddenly, with the permission of Jehovah and by the agency of Satan, deprived of his possessions and his children, and smitten with a sore

disease, yet submits patiently to the divine will. Three friends come to console him, and a large part of the poem is occupied with the speeches of his friends, who attribute his misfortunes to wickedness and hypocrisy, and his replies to them, until near the close, when God himself is introduced answering Job out of a whirlwind. In the sequel Job is delivered from his calamities, lives 140 years, becomes richer than he had been before, and begets seven sons and three daughters. The design of the book seems to be to enlarge men's views of the providence of God. It was probably written between the seventh and the fifth century B. C., and is certainly not earlier than the time of David. The basis of the story was probably traditional.

Job's Tears, an annual grass about a foot in height, a native of the East Indies and Japan, sometimes grown in hothouses. The hard, round, shining seeds, from whose fanciful resemblance to tears it derives its name, are used both for ornament and as food.

Jodhpur (jōd-pör') (or Marwar), a town of Hindustan, capital of the state of Jodhpur, Pop. 60,000. The state of Jodhpur is the largest in Rajputána, having an area of 37,000 sq. mi.; pop. 2,521,727.

Joel, one of the twelve minor prophets. Nothing is known of his life. He is generally supposed to have been contemporaneous with Hosea and Amos

Joe Miller, the name attached to a well-known collection of jests, first published in 1739. The name belonged to a comic actor, who had then a great reputation as a wit and humorist. The real compiler, however, was a John Mottley, an obscure author who died in 1750.

Johan'nesburg, a city in the Transvaal Colony and recognized as the central point of the gold fields of the district stretching southwest from Pretoria to Potchefstrom, and known as the Witwatersrand. It is connected by railroad with Delagoa Bay, Durban, Port Elizabeth, and Cape Town. The streets and squares of the town are well laid out, and the buildings solid and substantial. The white population was 40,000. When the Boer war began most of these withdrew. The town was captured by the English, May 31, 1900.

John, one of the apostles, often distinguished as *St. John the Evangelist*, the reputed author of the fourth Gospel, three epistles, and the Revelation, was the son of Zebedee and Salome, and the brother of James. Previous to his call by Jesus he was a fisherman on the sea of Galilee. His Gospel was written later than any of the others — according to some critics to refute particular heresies — and contains fuller details of our Lord's conversation and discourses than the other Gospels, and is also more doctrinal in character. Of the three epistles the first has much resemblance to the Gospel; but the other two were considered doubtful even by the early fathers. After the death of Jesus John continued at Jerusalem, and we afterward find him at Samaria (Acts 3 : 14–25). Tradition handed down by the fathers makes him die at Ephesus, and if he wrote the Revelation he must have been banished to Patmos. The time of his death is unknown.

John, called the *Baptist*, the forerunner of Christ, was b. six months before Jesus (their mothers were cousins), of a Levitical family in Judea. He lived an austere life, given up to solitary meditations, till A. D. 26, when he began to preach in the deserts of Judea, announcing that the kingdom of heaven was at hand, and proclaiming himself the harbinger of the Messiah. He baptized many converts, and testified to the higher mission of Jesus at the time of his baptism in the Jordan. To gratify a vindictive woman Herod Antipas, tetrarch of Galilee, caused him to be beheaded in prison.

John, the name of twenty-three popes of Rome from A. D. 523 to 1419, among whom are the following: John I (*St. John*), pope in 523 to 526. Theodoric sent him to Constantinople, to induce the Emperor Justin to adopt milder measures toward the Arians, and on his returning without success Theodoric threw him into prison, where he died. JOHN XII (*Octavianus*), Pope from 955 to 964. He called Otho to his aid to expel Berengarius and his son Adalbert, who had disjoined the patrimony of the Church. Otho succeeded and John in his gratitude crowned him Emperor of Germany. He presently conspired against the Emperor, however, and was deposed by him in 963. John XII introduced the custom of the Pope's assuming a new name on his accession. JOHN XIX was Pope from 1022 to 1029. An important event of his pontificate was the coronation of Henry. It was attended by two pilgrim kings, Rudolph III of Burgundy and Canute, the Danish king of England. JOHN XXII, Pope from 1316 to 1334. He possessed extraordinary abilities, was a patron of learning and wrote some medical treatises. He was a zealous worker for the propagation of the faith in distant lands. He lived a simple, student's life himself, but collected vast sums of money for the Church. JOHN XXIII, Pope 1410 to 1415, was a Neapolitan. While cardinal, he was prominent in the Council of Pisa. As Pope he called the Council of Constance, by which he was, however, deposed. After four years' imprisonment he was released and made Dean of the Sacred College.

John, king of England (1166–1216), was the youngest son of Henry II, by Eleanor of Guienne. Being left without any particular provision he got the name of *Sans Terre* or Lackland; but his brother, Richard I, on his accession conferred large possessions on him. He obtained the crown on the death of Richard in 1199, although the French provinces of Anjou, Touraine, and Maine declared for his nephew, Arthur of Brittany, who was lineally the rightful heir. A war ensued, in which John recovered the revolted provinces and received homage from Arthur. In 1205 his great quarrel with the pope began regarding the election to the see of Canterbury, to which the pope had nominated Stephen Langton. The result

was that Innocent III laid the whole kingdom under an interdict, and in 1211 issued a bull deposing John. Philip of France was commissioned to execute the decree, and was already preparing an expedition when John made abject submission to the pope, even agreeing to hold his kingdom as a vassal of the pope (1213). John's arbitrary proceedings led to a rising of his nobles and he was compelled to sign the Magna Charta or Great Charter June 15, 1215. But John did not mean to keep the agreement, and obtaining a bull from the pope annulling the charter, he raised an army of mercenaries and commenced war. The barons, in despair, offered the crown of England to the dauphin Louis, who accordingly landed at Sandwich May 30, 1216, and was received as lawful sovereign. The issue was still doubtful when John was taken ill and died at Newark in the forty-ninth year of his age.

John II, king of France (1319–64), surnamed the Good, was a monarch distinguished alike for his incapacity and his misfortunes. In 1356 he was defeated and taken prisoner by the Black Prince at the battle of Poitiers, and was detained at Bordeaux and at London till released at a heavy expense to his country by the Peace of Brétigny in 1360; but on learning that his son, the Duke of Anjou, who had been left as a hostage in England, had effected his escape, he returned to London, where he died.

John III (Sobieski), king of Poland (1624–1696), son of Mark Sobieski, a Polish captain, was b. in Olesko in Galicia, served in the French army, returned to Poland to repel the Russians in 1648, and greatly distinguished himself in several campaigns. On the death of Michael Corybut, he was chosen king. His most celebrated achievement was the relief of Vienna, besieged by a great army of Turks, whom he decisively defeated September 12, 1683.

John, Knights of St. (or Knights Hospitallers of St. John) afterward called *Knights of Rhodes*, and finally *Knights of Malta*, were a celebrated military religious order, originating in a monastery founded at Jerusalem in 1048 by some merchants from Amalfi. The monastery was dedicated to St. John the Baptist, and the monks, who were called Brothers of St. John or Hospitallers, had the duty of caring for the poor and sick, and in general of assisting pilgrims.

John Bull, a name first used by Dr. Arbuthnot, and since popularized as a typical name suggesting a humorous or burlesque representation of the English character. He is represented as a bluff, jolly, bull-headed farmer.

John of Gaunt, a corruption of *Ghent*, where he was b. in 1339, was fourth son of Edward II and his queen Philippa, daughter of the Earl of Hainaut. He was created Duke of Lancaster in 1362; served in the French wars, and became governor of Guienne. He assumed in right of his wife the title of king of Castile, invaded the kingdom to assert his claims, but subsequently relinquished them in favor of Prince Henry of Castile, who had become his son-in-law. His eldest son, Bolingbroke, became king of England as Henry IV. He d. Feb. 3, 1399.

Johns Hopkins University, an institution of higher learning at Baltimore, founded by Johns Hopkins in 1867. His gift of $7,000,000 provided for the establishment of a university and a hospital. The university now has an endowment of $3,500,000, a library containing 110,000 volumes, a faculty of 150 and an attendance of over 700 students. It has two departments, the Philosophical Department and the Medical School, in each of which instruction is offered to both undergraduates and graduate students. The advantages offered for postgraduate work are especially attractive, and the university annually awards a large number of scholarships and fellowships to American students desiring to do research work in literature, science or medicine. The Maryland Geological Survey and Weather Bureau are closely connected with the University. The president is Ira Remsen.

Johnson, Andrew (1808–1875), 17th president of the U. S., b. in N. Carolina. He was self-educated; entered Congress as a Democrat in 1843, and the Senate in 1857. On Lincoln's election he became vice-president, and thus became president upon the assassination of Lincoln in April, 1865. During his term of office he was in constant conflict with the Senate, and was impeached by the House of Representatives of high crimes and misdemeanors (February, 1868), the trial ending in a technical acquittal. A general amnesty to the rebels was his last presidential act.

Johnson, Eastman, artist, b. at Lovell, Me., in 1824. From his boyhood he devoted himself to art work. In 1849 he went abroad to study and after visiting the principal European galleries, established himself in Paris. In 1858 he settled at New York and was in 1860 elected to the National Academy. His favorite subjects are American rural life, though of late years he has devoted himself to portrait painting. Among his works may be mentioned *The School of Philosophy at Nantucket* and *The Old Kentucky Home.*

Johnson, Reverdy (1796–1876), statesman, was b. in Annapolis, Md., educated at St. John's College, studied law, and was admitted to the bar in 1815. In 1817 he went to Baltimore; was elected to the state senate in 1821, and to the U. S. Senate in 1845. He was attorney general in President Taylor's cabinet and was again elected senator in 1863. In 1868 he was appointed minister to England. On his return he resumed his law practise, which he continued until his death.

Johnson, Richard Mentor (1780–1850), vice-president of the U. S., b. in Kentucky, was admitted to the bar, and was a member of Congress from 1807 to 1819, of the U. S. Senate till 1829, and of Congress again till 1837. He served with great bravery in the war with Britain in 1812–13. In 1837–41 he was vice-president under Van Buren. He d. at Frankfort, Kentucky.

Johnson, Dr. Samuel (1709–1784), an eminent English author, son of a bookseller, was b. at Lichfield. In 1728 he entered Pembroke

College, Oxford, but was obliged by poverty to retire after three years without taking a degree. He became successively an usher in Leicestershire, a bookseller's drudge in Birmingham, and the head of a school established with some money he acquired by marrying, in 1736, Mrs. Porter, the widow of a mercer, considerably older than himself, but to whom he was sincerely attached. The school speedily failed; and in 1737, removing to London, Johnson entered on his long course of literary toil. His reputation rose very slowly; the greater part of his time was wasted for many years on desultory and occasional efforts. A large proportion of his writings appeared in the *Gentleman's Magazine*, or as pamphlets; and most of these are quite forgotten. *Rasselas*, written in a week to pay his mother's funeral, is one of the most interesting and characteristic of his works. His two sets of periodical essays, *The Rambler* and *The Idler*, were at first coldly received, but on being collected and reprinted they became very popular. For eight years from 1747 Johnson's attention was chiefly engaged by his *Dictionary of the English Language*, a work which appeared in 1755. The dictionary, though it raised his fame, added little to his worldly means; and Johnson lived in poverty till 1762, when he obtained through Lord Bute, a pension of $1,500 a year. He was thenceforth in easy circumstances, and could enjoy without restraint the society of Burke, Reynolds, Gibbon, Garrick, Goldsmith, and others in the famous club which became a formidable power in the world of letters. In 1763 the first interview with his now equally famous biographer, James Boswell, took place. In 1765 began his intimacy with the family of Mr. Thrale, the great brewer, and in the same year appeared his long-promised edition of Shakespeare. In 1773 Johnson made a tour to the Hebrides in company with his friend Boswell. In 1775 he received the diploma of D.C.L. from the University of Oxford, and soon after visited France in company with the Thrales. His last literary undertaking was his *Lives of the Poets*, which was completed in 1781. He was buried in Westminster Abbey. *Boswell's Life* may be said to convey a more favorable impression of Johnson's real strength, both in thought and language, than anything in the works which he wrote and published.

Johnston, Albert Sidney (1803–1862), Confederate soldier, was b. in Washington, Ky. His services in the Black Hawk and Mexican wars were distinguished. On the outbreak of the Civil War he resigned with reluctance an important command to take part with his native South. He was killed in the battle of Shiloh.

Johnston, Joseph E. (1809–1891), Confederate soldier, was b. in Longwood, Va. He served in the Florida Indian, and Mexican wars. In the Civil War he held high commands, surrendering only after the capitulation of General Lee. In 1877 he was elected to U. S. Congress.

Johnstown, Cambria co., Pa., 39 mi. s.w. of Altoona. Railroads: Pennsylvania, and Baltimore & Ohio. Industries: Iron and steel rail manufacturing. Coal, iron, and fire clay are found in great quantities in the vicinity. In 1889 the town and its suburbs along the Conemaugh River contained 45,000 inhabitants, when on May 31 the Conemaugh Lake and Reservoir, situated about 10 mi. above the town, broke and flooded the entire district. The railroad bridge at Johnstown acted as a dam where the mass of debris, houses, barns, churches, etc., were piled into an indiscriminate heap which finally caught fire, destroying the bridge, property, and many lives. The villages of Woodvale, Conemaugh, South Fork, Mineral Point, Morrellville, Cambria City, and Johnstown were almost entirely swept away. The loss of life was estimated at 2,500; 99 entire families were lost. An appeal for aid was generously responded to both at home and abroad, the cash contributions amounting to $4,116,801.58. Pop. 1900, 35,936.

Johnstown, Fulton co., N. Y., 48 mi. n. w. of Albany. Railroad, Fonda, Johnstown & Glovers. Industries: gloves, mittens, and shoe leather. Pop. 1900, 10,130.

Johore, an independent state at the southern extremity of the Malay Peninsula, with an area of 10,000 sq. mi. The country is densely covered with timber, and rises into several mountain peaks, the highest being Mount Ophir (4,186 ft.). The pop. numbers about 200,000, mostly Malays and Chinese. The former live by fishing and wood-cutting; the latter are traders and shopkeepers. The chief staples of the country are gambier and black pepper. All kinds of fruit are plentiful. The climate is tropical but healthy. The capital is Johore, 15 mi. n.e. of Singapore.

Joint Stock Companies, a species of partnerships in which a number of persons contribute funds or *stock* for the purpose of carrying on a trade or other profitable object. The management is vested in certain members called directors; and the general body of shareholders take no active part in the concerns of the company beyond exercising a control over the acts of the directors on special occasions. The capital is generally divided into equal shares, each member holding one or more, and in proportion to the number participating in the profits. After the stock of a company of this sort has been fully subscribed no one can enter it without previously purchasing one or more shares from some of the existing members. No member can demand payment of his share from the company, but he may, without consent of his fellow members, transfer his share to another person. In nearly all the states these joint stock companies are now, by statute, invested with some of the privileges of a corporation. Five or more persons associated for any lawful purpose may, by subscribing their names to a memorandum of association, form an incorporated company, with or without limited liability. The distinction between limited and unlimited liability companies is, that if an unlimited company contract any debts, no matter how large, every member is liable, if his fellow members turn out unable to

bear their proportions, to pay the whole of these debts to the extent of his fortune, whereas if the company is limited each member can in no event be called upon to pay more than he expressly guaranteed. A company may be registered in one of three forms: 1, as a company limited by shares, where the liability of each member is limited to the amount unpaid on the shares; 2, as a company limited by guarantee, where the liability of each member is limited to such amount as he undertakes in the memorandum of association to contribute to the assets of the company if it should be wound up; and 3, an unlimited company, where there is no limit to the liability of the members. In the first two cases the word "limited" must be added to the name of the company, and the amount of capital, object, place of business, and declaration of the limit or the amount of guarantee must be entered in the memorandum of association, which must be accompanied by articles of association providing for the management of the company.

Joint Tenants are those that hold lands or tenements, or other property, as goods and chattels, by one title, without partition. In a joint tenancy the last survivor takes the whole, as if the estate had been given to him only, unless any of his companions have conveyed away their shares by deed.

Joinville (zhwaṇ-vēl), Jean Sieur de (1224–1317), French historian, b. in Champagne. He early entered the service of Thibaut, king of Navarre, and in 1248 raised a troop of nine knights and 700 armed soldiers, and accompanied Louis IX in his first crusade to the Holy Land. He rose high in favor with Louis, shared his captivity, returned with him to France in 1254, and spent much of his time at court. His *Histoire de St. Louis*, which is one of the most valuable literary productions of the Middle Ages, has been often reprinted.

Jokai (yo'kah-e) **Maurus** (1825-1904), famous Hungarian novelist, b. at Komorn. He produced his first novel, *Working Days*, in 1846. He was prominent during the Revolution of 1848, was imprisoned and escaped. This period furnished the scene and plot for many later novels. The following are his best known works: *The New Landlord* and *Black Diamonds*. He was a journalist of note, and also wrote dramas, poems and essays to the number of about two hundred volumes, being one of the most prolific of modern authors. He died at Budapest.

Joliet, Louis (1645–1700), was b. in Quebec and educated at the Jesuit college there. In 1672 he was given command of an enterprise the object of which was to trace the course of the Mississippi River. By his explorations it became certain that the Mississippi flowed into the Gulf of Mexico. He afterward explored Labrador.

Joliet, Will co., Ill., on Desplaines River, 40 mi. s.w. of Chicago. Railroads: C. R. I. & P.; M. C.; C. & A.; A. T. & S. F.; J. E. & E., or Chicago outer belt. Industries: steel, nail, and wire mills, quarries, machine shops, pressed steel works, tannery, bridge works, and a number of other factories. The town was first settled in 1833, laid out as a town site in 1834, incorporated as a village in 1837, and became a city in 1852. It is the seat of the state prison. Pop. 1900, 29,353.

Jonah (Hebrew, signifying *dove*) one of the minor prophets, son of Amittai, and according to 2 Kings 14:25 a contemporary of Jeroboam II, was b. at Gath-Hepher, in Galilee. The book which bears his name is historical rather than prophetical, and the miraculous event of Jonah remaining three days and three nights in the belly of the fish has been regarded by some as an allegory. Orthodox theologians, however, are generally of the opinion that the mention of it by Christ (Matt. 12:39) obliges us to regard the event as really historical. Jonah's grave is shown at Mosul, the ancient Nineveh, and also at Gath.

Jones, In'igo (1572–1652), the reviver of classical architecture in England in the beginning of the seventeenth century. He went to Venice, where the works of Palladio inspired him with a taste for architecture. Having returned to England, he became court architect under James I and Charles I. Among his best known works are the Banqueting House at Whitehall, Asburnham House, Covent Garden Piazza, Heriot's Hospital, Edinburgh, and Shaftesbury House. Being a Roman Catholic

Jones, Jenkin Lloyd, b. in Cardiganshire, Wales, in 1830. In his boyhood his parents came to this country, and he was educated at Meadville Theological School in Pennsylvania. He was pastor of the Unitarian church, Janesville, Wis., and in 1883 became pastor of All Souls' Church, Chicago. Since 1880 he has edited the religious journal, *Unity*. Among his works may be mentioned, *A Chorus of Faith*, and *The Seven Great Religions*.

Jones, John Paul (1747–1792), a commander in the American naval service, was b. in Kirkcudbrightshire, Scotland. His father, whose name was John Paul, was gardener to the Earl of Selkirk. On the outbreak of war between the colonies and mother country he offered his services to the former, and in 1778, being then in command of the *Ranger*, he made a descent on Whitehaven, set fire to the shipping, and plundered the Earl of Selkirk's mansion. Next year, in command of the *Bon Homme Richard* (forty-two guns) and a small squadron, he threatened Leith, and captured the British sloop of war *Serapis* after a bloody engagement off Flamborough Head. On his return to America he was somewhat neglected by Congress, and in 1788 entered the Russian service with the rank of rear admiral, but owing to the jealousy of Russian commanders soon retired from this service. He returned to Paris, where he d. in poverty.

Jongleurs (zhon-*leur*), a class of French minstrels in the Middle Ages who used to wander about entertaining people by song, music, story, etc., and sometimes by juggling feats, tumbling, etc.

Jonquil (jon'kwil), a bulbous plant of the genus *Narcissus*, allied to the daffodil. It has long lily-like leaves, and spikes of yellow or

white fragrant flowers. The sweet-scented jonquil, a native of southern Europe, is also generally cultivated. Perfumed waters are obtained from jonquil flowers.

Jonson, BEN (or Benjamin) (1574–1637), a celebrated English poet, the contemporary and friend of Shakespeare. He was the posthumous son of a clergyman, and was b. at Westminster. He was placed at the Westminster grammar school, under Camden, at an early age, where he laid the foundation of his learning, but was ultimately withdrawn, it is said, by his stepfather, a master bricklayer, who wanted his assistance in the business. He soon tired of this occupation, entered the army as a private soldier, and showed much personal courage during a campaign in Holland. Returning to England he began his career as an actor, and in 1598 his drama, *Every Man in his Humor*, was printed. In 1599 he brought out his comedy of *Every Man out of his Humor*, which was followed by *Cynthia's Revels;* the *Poetaster; Sejanus*, a tragedy. In 1605 his comedy of *Volpone, or the Fox* appeared; in 1609 *Epicœne, or The Silent Woman;* in 1610 the *Alchemist;* in 1611 *Catiline*, a tragedy; and in 1614 *Bartholomew Fair*, a complete picture of Elizabethan low life. In 1619 he returned to England, received the honorary degree of A. M. from Oxford University, and on the death of the poet laureate was appointed his successor, and the salary raised to the sum of $500 by Charles I. Much of his time was spent at the Apollo, Mermaid, and other taverns, feasting, drinking, and engaging in those brilliant contests of wit in which in earlier days Shakespeare also took part. His latter days were spent, not perhaps in much pecuniary prosperity, but certainly in fame and honor, as the acknowledged chief of English literature. He died of an attack of palsy, leaving behind him an unfinished pastoral drama of great beauty, *The Sad Shepherd.* He was buried in Westminster Abbey, where a monument was erected to his memory with the inscription, "O rare Ben Jonson." Jonson's best dramas are excellent in plot and development, have strongly conceived characters and excellent traits of humor, but he is sometimes forced and unnatural, and deals perhaps too much with passing manners and eccentricities. He had a genuine lyrical power, seen in his short poems and the songs interspersed in his masques. Plate 9, Vol. I.

Joplin, Jasper co., Mo., 16 mi. s.w. of Carthage. Railroads: St. L. & S. F.; Missouri Pacific; K. C. Ft. S. & M.; and K. C. Ft. S. & S. Industries: smelting works, white lead works, flour mills, foundries, and machine shops. Surrounding country mineral, producing lead, zinc, and coal in large quantities. Pop. 1900, 26,023.

Jordan, the largest river in Palestine, and one of the most celebrated rivers in the world. It rises from several sources, uniting in Bahr-el-Hûleh, or the Waters of Merom. The upper part of the valley of the Jordan is hilly, arid, and barren, but it becomes more level and fertile as it approaches the Zerka. The river is muddy and full of small fish. In the dry season it is shallow, with an average width of from 30 to 50 yds. At its mouth it is about 180 yds. broad and about 3 ft. deep. It is subject to great inundations during the winter season. The valley of the Jordan forms one of the most remarkable depressions in the world, the Dead Sea being 1,312 ft. below sea level, and the total fall of the river being about 2,300 ft.

Jorullo (Xorullo) (*hō-rul'yō*), a volcano of Mexico, in the department of Michoacan, height, about 4,150 ft.

Joseph, one of the two sons of the patriarch Jacob by his favorite wife Rachel. His father's preference for him drew down the enmity of his elder brothers, who sold him to some Ishmaelitish slave dealers, by whom he was sold to Potiphar, a distinguished officer in Egypt. The story of his elevation to the position of vice regent of Egypt, and the settlement of his father and brothers there is well known (Gen. 37:1). Authorities still differ as to the period in Egyptian history to which Joseph's life belongs, some placing it before, others under, and others after the time of the Hyksos or shepherd kings.

Joseph, the husband of Mary the mother of Jesus, was a descendant of the house of David though resident at Nazareth, where he followed the trade of a carpenter. Early tradition represents him as an old man at the time of his marriage, and he seems to have died before the commencement of the public ministry of Jesus. His day in the Roman Catholic calendar is March 19.

Joseph of Arimathæa, i.e., of Ramathaim in Benjamin, a member of the Jewish Sanhedrim, who, though a believer in Jesus, had not the courage to make open profession of his faith. Nevertheless, after the crucifixion he went to Pilate, begged the body of Jesus, and along with Nicodemus buried it in his own garden.

Joseph I (1678–1711), emperor of Germany, eldest son of Leopold I, became emperor in 1705. He was a zealous member of the alliance against France in the War of the Spanish Succession, in which the victories of Marlborough and Eugene won glory for the imperial arms.

Joseph II (1741–1790), German emperor, son of Francis I and Maria Theresa. He was elected king of the Romans in 1764, and on the death of his father, 1765, German emperor, succeeding his mother, however, in the hereditary estates of the House of Austria only in 1780. He at once commenced an extensive scheme of reforms, but the country was not prepared for such sudden changes, and he was compelled to give up most of his plans. In 1788 he visited Catherine II at Cherson, and in league with her made war against Turkey.

Joséphine (zho-sā-fēn) (1763–1814), Empress of the French, was b. in Martinique. She married in 1779 Vicomte Alexandre Beauharnais, by whom she had two children, Eugène and Hortense. In 1794 her husband, who had been commander of the army of the Rhine, was executed by order of the Convention. After the fall of Robespierre she paid a visit

to Napoleon to thank him for restoring the sword of her husband, and so pleased him that he soon after married her (1796). She became a beneficial element in his life, and her amiable manners won the hearts of everybody and helped to secure her husband's position. When Napoleon ascended the throne in 1804 she was crowned along with him. But the fact that the union was childless stood in the way of Napoleon's ambition to become the founder of a dynasty, and in 1809 Josephine was divorced, retiring to her beautiful seat of Malmaison, with the title of empress-queen-dowager and an annual grant of two million francs.

Jose'phus, FLAVIUS (37–?), the historian of the Jews, was b. at Jerusalem. In 64 A. D. he made a journey to Rome, and was introduced to Poppæa, the wife of Nero. On his return he found his countrymen preparing to throw off the Roman yoke, and having tried in vain to persuade them of the hopelessness of such a struggle, he accepted the post of defending the province of Galilee, and actually held the fortified town of Jotapata against the whole Roman army for forty-seven days. He was captured at the fall of the city, was afterward present in the Roman army at the destruction of Jerusalem (A. D. 70), and went with Titus to Rome, where, assuming the family name of his patron, Flavius, he lived in learned leisure. Here he wrote (in Greek) *The History of the Jewish War; The Antiquities of the Jews*, giving a history of the Jews from the earliest times to the reign of Nero; an *Autobiography*, mostly relating, however, to the time of his military activity; a work on the *Antiquity of the Jewish People*, directed against Apion, an Alexandrian grammarian. The date of his death is uncertain. He certainly saw the end of the century.

Josh'ua, the successor of Moses in the command of the Israelites, was the son of Nun, of the tribe of Ephraim. He was nominated by Moses to succeed him in the command of the army of Israel, led the Israelites over the Jordan, and in the course of seven years conquered the greater part of Palestine, and divided the country among the tribes. He d. at Timnath-Serah in Mount Ephraim at the age of 110. His history is contained in the canonical book which bears his name, and of which he has been usually regarded as the author; but modern critics have shown that it is a composite narrative, and contains references to many events which took place after Joshua's death.

Josi'ah, king of Judah, succeeded his father Amon at the age of eight years 639 (B.C.). He took an active part in the reform of public worship, and commenced the restoration of the temple, during the progress of which the high priest Hilkiah discovered the book of the law, thought by some to be substantially the same as the book of Deuteronomy. The prescriptions it contained gave a decided direction to the reform movement which the king conducted with great vigor. In his thirty-first year, prompted probably by friendship to the king of Assyria, he marched out against Pharaoh Necho, who was on his way to attack that kingdom. The two armies met at Megiddo, where Josiah was slain.

Jotuns (yō'tunz), in northern mythology, immense giants and magicians, who had command over the powers of nature, and lived in dark caves in their kingdom of Jotunheim, from which they waged perpetual war against the Æsir, the bright gods of Valhalla. Originally they represented the destructive forces in nature. They were cunning, malignant, versed in witchcraft, but not highly intelligent.

Jouffroy d'Abbans, CLAUDE, MARQUIS DE (1751–1832), claimed by the French as the inventor of steam navigation, served in the army, and did in 1783 make a small paddle-wheel steamboat sail up the Rhone at Lyons — the connection between piston and paddle-wheel axle being rack-and-pinion. Compelled to emigrate by the Revolution, he failed, on account of financial ruin, to float a company till after Fulton had made his successful experiments on the Seine in 1803.

Joule (jōl), JAMES PRESCOTT (1818–1889), English physicist. He studied under Dalton the chemist, made researches in electro-magnetism, about 1840 turned his attention to the subject of heat, and ultimately established the theory of the mechanical equivalent of heat. His published works consist mainly of papers read before the *Royal Society*, of which he was made a fellow in 1850, receiving its medal in 1852, and the Copley medal in 1870.

Journalism. See *Newspapers.*

Journalism, SCHOOL OF, a department established by Joseph Pulitzer of the N. Y. *World* in 1903, at Columbia University, for the systematic training of young men in the profession of journalism. The school has an endowment of $2,000,000. The course of study includes newspaper administration and manufacture, the laws, ethics and history of journalism, and several other practical courses.

Jovia'nus, FLAVIUS CLAUDIUS, Roman emperor (A. D. 363–364). He ceded the fine provinces beyond the Tigris to the Persians.

Jowett, REV. BENJAMIN (1817–1893), English scholar, master of Baliol College, Oxford. He studied at Oxford, was elected to a fellowship in 1838, and became regius professor of Greek in 1855. In 1860 appeared his essay on the *Interpretation of Scripture* in the celebrated *Essays and Reviews*, for which he was tried on a charge of heresy before the chancellor's court, but was acquitted. In 1870 he became master of Baliol, and in 1871 published his most important work, a translation of the *Dialogues of Plato*. He has published translations of *Thucydides* (1881) and the *Politics of Aristotle* (1885). In 1882 he was elected vice chancellor of the university.

Juan (jō'an) **de Fuca,** STRAIT OF, the strait between Vancouver Island and Washington on the Pacific coast.

Juan Fernandez, so called from the name of its discoverer, also sometimes Mas-a-Tierra, an island in the South Pacific Ocean, about 400 mi. off the coast of Chile, to which it belongs.

Parts of it are fertile, producing various kinds of timber, peaches, figs, grapes, cherries, etc. There are excellent fish. The island is occupied by some hundreds of settlers, whose chief occupation is the furnishing of fresh vegetables, water, and wood to the whaling or other vessels that call here. De Foe is said to have founded his Robinson Crusoe on the history of the solitary residence here for over four years (1704–9) of a Scotch sailor, Alexander Selkirk.

Juarez (*hụ-â-reth'*) BENITO PABLO (1806–1872), president of the Mexican Republic, was born of pure Indian parentage, and was elected president in 1861. He declared the suspension of public payments for two years to Europeans, a step which occasioned the interference of Britain, Spain, and France. Troops were landed in Mexico in 1862, but Britain and Spain soon retired, leaving Napoleon III to carry out his views alone. Maximilian of Austria came on Napoleon's invitation to assume the throne, but Juarez, in spite of defeats and losses, continued to head a resistance, and when Napoleon under pressure from the American government withdrew his troops in 1866, the republicans carried all before them. Maximilian was captured and shot, and Jaurez was re-elected to the presidency (1867), which he held till he died.

Ju'bilee, a festival of the Jews, held every fiftieth year. During this year all slaves or captives were to be released; all estates which had been sold reverted to their original proprietors or their descendants; and the ground was to lie fallow. It has been doubted whether the law of jubilee was ever actually observed until the return from Babylonian exile, when, for a time at least, it came into operation.

Jude'a, a term applied after the return of the Jews from exile to that part of Palestine bounded e. by the Jordan and the Dead Sea, n. by Samaria, w. by the Mediterranean, and s. by Arabia Petræa.

Judah, the fourth son of the patriarch Jacob by his wife Leah, the progenitor of one of the twelve tribes.

Judas, surnamed *Iscariot,* meaning, perhaps, the man of Kerioth, a village of Judea, was one of the twelve apostles of Jesus, and betrayed his Master into the hands of the Jewish priests for thirty pieces of silver. Remorse for his crime led him to suicide.

Judas (or Jude), brother of James, one of the twelve apostles. Matthew and Mark call him *Thaddæus surnamed Lebbæus.* Nothing is known of his life. By many he is considered the author of the Epistle of Jude.

Judas Tree, is a native of the Levant, Spain, south of France, Italy, etc. It grows to the height of about 20 ft., with pale green leaves and beautiful purple flowers, which are eaten mixed with salad or made into fritters. Red bud, another species, growing in Canada and the U. S., is smaller.

Jude, one of the books of the New Testament. Its acceptance by the early church was delayed until, like the writings of the evangelists, its divine inspiration was undoubted. In it the apostle denounces the heresies of the Simonians, the Nicolaites and the Gnostics, and appeals to the members of the Christian Church to faithfully adhere to its teachings. The book not having appeared as early as the writings of his contemporary apostles caused some to regard it as apocryphal. The Church, however, removed all doubt about its inspired orthodoxy by canonical recognition. The epistle was written in Palestine about 62 A.D.

Judge, a person duly invested with authority to determine causes or questions between parties according to law. The term is quite a general one, being applicable to any one appointed to sit in a court of law and try cases; but certain judges are designated by some particular title, as *justice, lord-justice,* etc. The judge at common law decides points of law, and enables the jury rightly to decide questions of fact, while in equity he decides both classes of questions. A judge cannot be prosecuted for the consequences of his decisions, except in the case where he may have acted without jurisdiction, nor can he officiate in a case where he has a personal interest, unless it be merely his common interest as a citizen, ratepayer, etc.

Judges, BOOK OF, a canonical book of the Old Testament, so called because the greater part of the narrative is occupied with the history of the judges who were raised up to deliver their countrymen from the oppression of their neighbors.

Judgment, in law, the judicial determination and decision of a court in an action. It is either interlocutory or final. In the former case it is given only on some particular point or proceeding, and does not complete the action in the same way as the final judgment, upon which, unless it be appealed against, suspended, or recalled, execution may follow.

Judgment Debt, in law, a debt secured to the creditor by a judge's order, and in respect of which he can at any time attach the debtor's goods and chattels. Such debts have the preference of being paid in full, as compared with simple contract debts.

Judith, widow of Manasses, a Jewish heroine, whose history is given in the apocryphal book which bears her name. Judith is represented as going out to the tent of Holofernes, an Assyrian general who was besieging Bethulia, the city in which she lived, charming him with her beauty, and taking advantage of the admission to his tent, thus afforded to her, to cut off his head with his own sword while he slept.

Juggernaut. See *Jagannâtha.*

Juglanda'cæ, the walnut tribe, a nat. order of plants, chiefly found in North America. They are trees with alternate pinnate stipulate leaves, and unisexual flowers, the males in catkins, the females in terminal clusters or loose racemes. Besides the walnut the order includes the butternut and hickory.

Jug'ular Vein, one of the large trunks by which the greater part of the blood that has circulated in the head, face, and neck is returned to the heart. There are two on each side, an external or superficial, and an internal or deeper.

Ju'jube, the popular name of a genus of spiny and deciduous shrubs or small trees. The species are numerous, and of several the fruit, which is blood-red or saffron colored with a sweet granular pulp, is wholesome and pleasant to eat. The common jujube is a native of Syria, from which it was introduced into Europe. The fruit is dried, and forms an article of commerce. *Z. Lotus*, which some believe to have given name to the ancient Lotophagi, a shrub 2 or 3 ft. high, is a native of Persia and the north of Africa. *Z. spina Christi*, or Christ's Thorn, is said to have furnished the branches of which our Saviour's crown of thorns was made. The name jujube is also given to a confection made of gum arabic and gelatin, sweetened and flavored so as to resemble the jujube fruit.

Jujuy (*hu-hö'i*), a town of the Argentine Republic, capital of a prov. of same name, is situated in the Rio Grande, and carries on an active trade with Chile and Bolivia. Pop. 5,000. Area of province, 27,000 sq. mi. Pop. 90,000.

Julep (from Persian, *gulāb*, rose water), a sweet drink; specifically, in medicine, a solution of sugar in aromatic water, but not so concentrated as syrup. In the U. S. the name is given to a drink composed of spirituous liquor, as brandy or whisky, sugar, pounded ice, and a seasoning of mint; also called mintjulep.

Julian (Flavius Claudius Julianus) (331–363), a Roman emperor, was b. at Constantinople. He was brought up in the Christian religion, studied philosophy and letters, and resided in Athens, where he was induced to embrace Paganism. Having received command of an army against the Germans, he defeated them at Strasburg, and drove them beyond the Rhine. He also displayed great talent as an administrator in Gaul. The emperor now became jealous of Julian, and recalled his best troops under pretense that he wanted to employ them against the Persians. This order caused a rebellion among the soldiers, who proclaimed their leader Julian emperor in March, 360, in spite of his own resistance. Constantius prepared to proceed against him, but soon after died, and Julian was generally recognized as emperor. He sought to restore the heathen worship in all its splendor, and on that account opposed Christianity as much as was in his power, without, however, persecuting the Christians themselves. He even sought to falsify the words of Christ by rebuilding the Jewish temple. In 363 he headed an expedition against the Persians, and took several cities, but was mortally wounded.

Julian Calendar. See *Calendar* and *Epoch*.

Julius, the name of three popes of Rome (337–1555).

July, the seventh month in our calendar, having 31 days. In the Roman year it bore the name of *Quintilis*, as originally the fifth month. Its change of name to *Julius* was in honor of Julius Cæsar, who was born on the 12th of the month.

Jumping Deer, the black-tailed deer, found in the U. S. to the west of the Mississippi.

Jumping Hare, a species of jerboa found in Southern Africa, and so named from its general resemblance to a hare, while its jumping mode of progression, necessitated by the elongated nature of the hind legs, have procured for it its specific and popular distinction.

Jumping Mouse is found in Labrador and North America generally, but is especially an inhabitant of the fur territories. Like the jumping hare, it is classified by some along with the jerboas, and is one of the smallest of these.

Juna'garh, a native state of India, in Gujaret, Bombay Presidency; area 3,283 sq. mi.; pop. 387,499. The capital, Junagarh, situated under the Girnar and Datar hills, is one of the most picturesque cities in India, and has recently been greatly improved by the erection of public and other buildings. Pop. 24,679.

Jun'ceæ (or Junca'ceæ), the rush order, a small natural order of endogenous plants, so named from the typical genus *Juncus*. It is principally composed of obscure herbaceous plants with brown or green glumaceous hexandrous flowers, the perianth being in two series, as in Liliaceæ, but calycine instead of petaloid. Some of them, as the common rush, are employed for making mats and chair bottoms.

Junction City, Geary co., Kan., on Smoky Hill and Republican River, 140 mi. w. of Kansas City. Railroads: Union Pacific; M. K. & T.; and J. C. & Ft. K. Industries: two flouring mills, iron foundry, farm implement factory, and others. Surrounding country agricultural. Is 2½ mi. from Ft. Riley, the largest military post in the U. S. The town was first settled in 1855. Pop. 1900, 4,695.

June (Lat. *Junius*), the sixth month in our calendar. It consisted originally of twenty-six days, to which it is said Romulus added four, and Numa took away one. Julius Cæsar again lengthened it to thirty days, and it has ever since remained unaltered.

Juneberry, a North American wild tree common in Canada and the States, and allied to the medlar. The fruit is pear shaped, about the size of a large pea, purplish in color, and a good article of food. *Service-berry* and *shadbush* are other names.

Jungfrau (yung'frou; "Maiden"), a mountain of Switzerland, in the Bernese or Helvetic Alps, on the frontiers between the cantons of Bern and Valais, 12 mi. s.s.e. Interlaken. It is one of the most magnificent mountains in Switzerland and the loftiest calcareous mountain in Europe; height, 13,670 ft. It was first ascended in 1808. A new electric railway, 7¾ miles long, ascending the mountain was opened in 1903. A striking feature of the route is a tunnel 6 2 miles in length.

Jungle (yun'gl), properly an Indian term applied to a desert and uncultivated region whether covered with wood and dense vegetation or not, but in English it is applied to land covered with forest trees, thick, impenetrable brushwood, or any coarse, rank vegetation.

Jungle Fever, a disease prevalent in the East Indies and other tropical regions, a severe variety of remittent fever. It is characterized by the recurrence of paroxysms and of cold and hot stages. The remissions occur

usually in the morning and last from eight to twelve hours, the fever being mostly typically developed at night.

Junin (hō-nēn′), a department of Peru, embracing the wildest parts of the Cordilleras; area about 28,000 sq. mi.; pop. 209,871.

Ju′niper, the name of hardy, exogenous evergreen trees and shrubs of the genus *Junipĕrus*, chiefly natives of the northern parts of the world. They belong to the natural order Coniferæ, group Gymnospermæa. About twenty species are known. The common juniper is a common bush growing wild in all the northern parts of Europe, and abundant on the mountains of Wales, Scotland, and Ireland, and on low ground in the northern parts. The berries require two years to come to maturity, when they assume a bluish-black color. They are used extensively in Holland in the preparation of gin, which owes its characteristic flavor to them. They yield an essential oil, which is a powerful diuretic. *J. sabina* or *savin* also yields a powerful diuretic, and an oil which is a local irritant. *J. virginiāna* and *J. bermudiāna* are trees. The former is the common red cedar of North America, and the latter is known as Bermudas cedar. Both yield a wood used by cabinetmakers, etc., and in the manufacture of pencils.

Branch of Juniper, with berry.

Ju′nius, a signature attached to certain letters on public affairs which first appeared in *The Public Advertiser*, a London paper published by Woodfall, from which they were copied into most of the other journals of the time. The earliest bears date Jan. 21, 1769; the last, Jan. 21, 1772. After they were completed they were collected and published by Woodfall, with a dedication to the English nation and a preface by the author. Other letters, bearing the same characteristics, but having different signatures, appeared between April 28, 1767, and May 12, 1772, and are given in the younger Woodfall's edition as the *Miscellaneous Letters*. Although fully a century has elapsed since the publication of these papers, their authorship seems as far from being settled as ever. With these characteristics and this wide information he united a boldness, vehemence, and rancor, which, combined with his epigrammatic and unsparing invective, rendered him an object of terror to those whom he attacked. Public suspicion at the time was fixed most strongly on Burke and Viscount Sackville. But Burke denied the authorship spontaneously to Dr. Johnson, and on several points Burke and Junius were in direct opposition to each other. That Viscount Sackville was the author received considerable belief at the time. The opinion that Sir Philip Francis (d. 1818) was Junius has been probably the most common. But the internal argument is against the supposition.

Junk, a flat-bottomed ship used in the waters of China and Japan, sometimes reaching 1,000 tons. It has a high forecastle and poop, and ordinarily three masts of considerable height, each mast being made in one piece, with a lug-sail, generally of bamboo splits. The bow is bluff, the stern full, and there is a very large rudder.

Juno, the most exalted divinity of the Latin races in Italy next to Jupiter, of whom she was the sister and wife; the equivalent of the Greek Hera. She was the queen of heaven, and under the name of Regina (queen) was worshiped in Italy at an early period. She bore the same relation to women that Jupiter did to men. She was regarded as the special protectress of whatever was connected with marriage, and females from birth to death had her as a tutelary genius. She was also the guardian of the national finances, and a temple, which contained the mint, was erected to her under the name of Juno Monēta on the Capitoline.

Junta (Spanish, an assembly) in Spain, a high council of state. It was originally applied to an irregularly summoned assembly of the states, as distinguished from the Cortes or parliament regularly called together by the authority of the king.

Jupatí Palm (jo͞o-pä-tē′) a palm which grows on the rich alluvial tide-washed soil on the banks of the Lower Amazon and Para rivers in Brazil. The trunk is only 6 or 8 ft. high and 1 ft. in diameter. The leaves rise nearly vertically from the trunk, bending out on every side in graceful curves, forming a magnificent plume 70 ft. in height and 40 ft. in diameter. Leaves have been measured 48 and 50 ft. long, and even these are not the largest. The leaf-stalks, which measure from 12 to 15 ft. in length, are used by the natives for a variety of purposes, as for the walls of houses, baskets, boxes, etc. Their rind yields fibrous filaments (*raphia* fiber) which are imported into Europe for agricultural tie-bands, etc.

Jupiter (or Juppiter), the supreme deity of the Latin races in ancient Italy, the same as the Greek *Zeus*, and the Sanskrit *dyaus* (which means the sky); the second part being the same as the Latin *pater*, father. As the supreme deity Jupiter received from the Romans the title of *optimus maximus* (best, greatest), and as the deity presiding over the sky he was considered as the originator of all the changes that took place in the sky. From him accordingly proceeded rain, hail, and the thunderbolt, and he it was that restored serenity to the sky after it had been obscured by clouds. Hence the epithets of Pluvius (rainy), Tonans (thundering), etc., were applied to him. The most celebrated of his temples was that on the Capitoline Hill dedicated to him as Jupiter Optimus Maximus, jointly with Juno and Minerva. He was represented with a scepter as symbolical of his supreme authority. He maintained the sanctity of oaths; he was the guardian of all

property; and every Roman was believed to be under his protection, and that of his consort Juno, the queen of heaven. White animals were offered up to him in sacrifice, his priests wore white caps, and his chariot was represented as drawn by four white horses.

Jupiter is the largest planet of the solar system, and the fifth (excluding the asteroids) in order of distance from the sun. His mean diameter is about 85,000 mi., his polar diameter about 82,200; his mean distance from the sun 475,692,000 mi.; his period of revolution round the sun 11 years 10⅛ months; his orbit is inclined to the ecliptic at the angle 1° 18′40.3″). The inclination of his axis is very small (3° 5′ 30″), so that changes in the seasons must be almost unknown. His volume is 1,233 times that of the earth, but his mass is only 300,857 times. His surface shows belts of dark and light shade, which are usually, but not always, parallel to each other, undergo quick changes, and seem as though they merge into one another. To account for these rapid changes in his atmosphere it seems reasonable to believe that his interior mass is intensely heated similarly to that of the sun, hence the intense light proceeding from this planet. Jupiter has four moons, Io, Europa, Ganymede, and Callisto; they were discovered by Galileo in 1610; they are at average distances of 267,380 to 1,192,820 mi. from the planet; they appear, like our moon, to make one revolution on their axis while passing once around the planet, the time of one revolution being from 1 day 18 hours 27 minutes to 16 days 16 hours 32 minutes. Europa, the smallest, has a diameter of 2,099 mi.; Ganymede, the largest, has a diameter of 3,436 mi. The moons appear from the earth to move in nearly straight lines from one side of the planet to the other, so that the planes of their orbits are nearly the same as the ecliptic and the orbit of Jupiter; they are eclipsed in the shadow of the planet, and their own shadows may be seen passing over the planet's surface. From observation of the eclipses of Jupiter's satellites Römer discovered that the propagation of light is not instantaneous, and thus calculated its velocity.

Jura (zhü-rȧ), a department in the east of France, bordĕring on Switzerland; area 1,938 sq. mi. A large part is covered by the Jura mountains and it is drained by the Ain and Oignon. The pastures are both extensive and rich, and the cattle reared on them, together with their dairy produce (including Gruyère cheese), form the chief source of wealth. Iron is worked, marble and alabaster abound, and there are salt springs in different quarters, from which salt is made. Lons-le-Saulnier is the capital. Pop. 273,028.

Jura, a chain of mountains in Central Europe, partly belonging to France, partly to Switzerland, between which they form a sort of natural barrier. The principal geological formation is the Jura limestone, with green sand, belonging to the lower cretaceous series. Stalactite caves are numerous. The two chief rivers which have their source in the chain are both French—the Ain and the Doubs—and descending from its western slopes, belong to the basin of the Rhone. Its highest points are Crêt de la Neige, Reculet, Mont Tendre, and Dôle, the heights of which are respectively 5,651, 5,645, 5,517, and 5,514 ft.

Jurassic System, the name given by geologists to what is termed in England the *Oolitic system* of strata, being very characteristic of the Jura mountains; and also used in a wider sense to include both the Oolite and Lias.

Jurua, (zhu-ru-ä′), a little-known river of northwestern Brazil, which rises on the borders of Peru and enters the Amazon on the right. Length, 700 or 800 mi.

Jury and Jury Trials.—The origin of trial by jury is not traceable to any single legislator or any particular period. It seems to have had its beginning in certain primitive customs of the northern European races, and received special developments from different nations. By the Anglo-Saxons a person who was accused of crime was permitted to summon twelve of his neighbors, called compurgators, who swore to his innocence. This was the origin of an institution which took settled and vigorous form after the Norman Conquest, gradually developing into its present form.

In criminal trials two juries act, the *grand jury* and the *petty jury.* The *grand jury* may consist of any number more than eleven and less than twenty-four men, who have been summoned by a mandate from the sheriff of the county. Their names are returned on a piece of parchment which is called a *panel.* The oath having been administered, they are usually instructed by the presiding judge in the nature and number of the offenses about to be brought before them. They then proceed to consider in private the statement or *indictment* which is brought against the accused by the prosecution. Should they agree, to the number of twelve, that the accusation has a basis of truth, they bring into court what is called "a true bill." If, on the contrary, they find that there is no sufficient foundation for the accusation, they *ignore* the bill, and require the dismissal of the accused. When a true bill is found by the grand jury it usually forms the basis of the subsequent prosecution.

Petty or *petit juries* consist of twelve persons, and no more, for the trial of all criminal offenses, and of all issues of fact in civil cases at the common law. No juror is at liberty to leave the box without permission of the court. Unless a case be a criminal one in which the prisoner is charged with a misdemeanor, the jury are allowed to go home on engaging not to allow themselves to be spoken to on any subject connected with the trial. When the prisoner is charged with treason or felony the jury are usually allowed to retire only in custody of the sheriff and his officers, who are sworn to keep them together, and not to speak to them with reference to the trial. When the evidence has been led it is usual for the presiding judge to instruct the jury in the points of law which apply to it. It is thus that their duties are divided—the jury dealing with

the facts, and the judge with the law of the case. The jury usually form an independent judgment upon the facts, and their finding is considered final. To consider their verdict they usually withdraw to a private room, where no intercourse with other persons is permitted, and where, when the session is protracted, food and other necessaries are supplied. Upon returning into court they publicly assent to such verdict as they have agreed upon. If they fail to agree among themselves the jurymen are discharged by the judge, and the cause, if it is civil, can be tried anew. When it is a criminal case, a new trial is possible.

Another kind of jury is the *coroner's jury*, summoned to inquire into cases of sudden or violent death. The inquiry is made in presence of the body, and at the place where the death happened. The jury may consist of any number above eleven, and usually numbers twenty-three; twelve must concur in the finding. The persons found guilty are reserved for trial by a petty jury.

Juste-milieu (zhûst-mē-ly*eu*), a French expression signifying "the true mean;" specifically applied to that method of administering government which consists in maintaining itself by moderation and conciliation between the extreme parties on either side.

Justice of the Peace, a judicial magistrate intrusted with the conservation of the peace. In the U. S. the office is held only by special appointment, and the tenure is different in different states; but the commission is usually for three or four years, or some other specific limited period. Their position is similar to that of justices in Britain. In some of the states they have a right to celebrate marriages.

Justification, a theological term employed to designate the act by which a person is accounted just or righteous in the sight of God, or placed in a state of salvation. This conception of God as a judge who absolves the sinner on account of Christ's merit and imputed righteousness, is based upon the Pauline writings, and received its most pronounced expression at or immediately after the Reformation.

Justin (Justi'nus), the name of two emperors of the East. Justin I (450–523), a peasant of Dacia, rose from a common soldier to be commander of the imperial guard, and on the death of Anastasius in 518 became emperor. He relegated the civil administration to the quæstor Proclus, and between them the empire was governed with a fair amount of success. Justin II ascended the throne on the death of his uncle Justinian I in 565. Beset with enemies outside the empire and harassed with internal discord, he in 574 solved his difficulties by abdicating in favor of Tiberius, captain of the guard.

Justin'ian I (Flavius Anicius Justinianus) (483–565), surnamed the *Great*, nephew of Justin I, emperor of the East, celebrated as a lawgiver, was born of an obscure family. On the death of his uncle with whom he had latterly shared the imperial power, he was proclaimed emperor, and married an actress named Theodora. Aided by his generals, he was able subsequently to restore to the Roman Empire a part of its former possessions, as when Belisarius in 523 and 529 defeated the Persians, and achieved victories in Africa, and when Narses, another of his generals, put an end to the Ostrogoth rule in Italy. Turning his attention to the laws, Justinian commissioned ten learned civilians to draw up a new code, and the result was the *Corpus Juris Civilis* or *body of civil law*. He took great interest in building cities, fortifications, and churches; among the latter he rebuilt the church of St. Sophia at Constantinople. To maintain his public munificence he oppressed the people with taxes, and suffered his servants to commit the most flagrant crimes. His reign of thirty-eight years was a great period in the empire's history, but the emperor himself was by no means great.

Jute, a textile fabric obtained from *Corchŏrus capsulāris*, a plant belonging to the natural order Tiliaceæ (lime or linden). The jute plant is a native of the warmer parts of India, where its cultivation is carried on, especially in Bengal, on an extensive scale. It is an annual plant, growing to a height of 12 or 14 ft. The fiber forms the inner bark of the plant, and possesses in an eminent degree that tenacity common to the bark of the plants of this order. The fiber is fine, and has a shining surface; it is injured by exposure to water, and hence is not well adapted for cordage and canvas, but is in extensive use for making bags, and in the U. S. and Great Britain serves many useful purposes, being mixed with hemp for cordage, and with silk in the manufacture of cheap satins; its principal use is in the manufacture of coarse cloth for bagging, and in making the foundation of inferior carpets, mats, etc. In Bengal, jute has been cultivated and its fibers woven into various fabrics from a remote period, but it is only since about 1830 that its manufacture has risen to importance in Europe. The headquarters of this branch of industry are at Dundee. The rice, cotton, sugar, coffee, pepper, and other articles of East Indian commerce are almost wholly carried in gunny-bags (as the jute bags are called), large quantities of which are made in and exported from Bengal itself.

Jute; *a*.—flower; *b*.—fruit.

Jutland (Danish, *Jylland*), the peninsula and most important portion of Denmark, sur-

Juvenal

rounded on three sides by the sea—the Skager Rack, the Kattegat, and the North Sea, on the south by Sleswick; area 9,755 sq. mi. The climate on the whole is temperate, but variable. The inhabitants are considered to be the most genuine specimens of the old Danish stock, and have preserved both the language and the manners and customs of early times in their greatest purity. Its earlier inhabitants, the Jutes, took part in the expedition of the Saxons to England. Pop. 942,120.

Ju'venal (Decimus Junius Juvenalis) (42 A. D. ?), Latin satirical poet, was b. probably at Aquinum, a Volscian town. He is said to have been the adopted child of a wealthy freedman; to have been by profession a pleader; to have been the friend of Martial; and to have died in Egypt as an exile in charge of a cohort of infantry. Nothing of this is authentic; we only know certainly that he resided in Aquinum, and flourished about the end of the first century after Christ. His extant works are sixteen satires, composed in hexameters, and giving in powerful language, inspired by a bitter and heartfelt indignation, a somber picture of the corrupt Roman society of that era. His satires have also been translated by Gifford, and some of them by Dryden, while Johnson's imitations of the third and tenth (under the titles *London* and the *Vanity of Human Wishes*) are well known.

K

K, the eleventh letter of the English alphabet, representing a guttural articulation, the surd consonant corresponding to the sonant *g*. In Anglo-Saxon this letter was only used occasionally, *c* being regularly used instead. So also in Latin, *k*, borrowed from the Greeks, was little used, its place being supplied by *c*. The Italians, Spaniards, and Portuguese have banished the letter entirely from their alphabet. The French use it only in a few words derived from the Greek, foreign proper names, etc. At the beginning of a word or syllable *k* is not pronounced when followed by *n*, as *knife, knee, know.*

Kaaba (kä'å-bà) (or Caaba), the sacred shrine at Mecca to which Moslems make their pilgrimages. It is a flat-roofed quadrangular structure about 40 ft. high, 55 ft. long, and 45 broad, and stands in the center of the mosque or sacred area, which is inclosed by walls and colonnades. At the southeast corner of the Kaaba, built into the wall, is the famous "black-stone" or *Keblah*, the point to which every pious Moslem directs his face in prayer, and which is devoutly kissed by the pilgrim. According to Mussulman tradition, this was originally of a dazzling white, and was brought from heaven by Gabriel to Abraham when he was erecting the Kaaba. Round the Kaaba are various sacred buildings, and near it the Zem-Zem or holy well.

Kadiak, an island south of Alaska, and like it belonging to the U. S. The inhabitants, below 3,000 in number, resemble the Eskimos, and live by hunting and fishing, a considerable fur trade being done.

Kaffa, a mountainous territory to the south of Abyssinia, inhabited by one of the Galla tribes. It is supposed to be the home of the coffee plant, which grows wild on the slopes of the Kaffa hills. The chief town is Bonga.

Kaffir Bread, a kind of sago obtained from the stems of one or two plants of the Cycas family, natives of South Africa.

Kaffirs (Kaffres, or Caffres) (from the Arabic *Kafir*, infidel or unbeliever), the principal race inhabiting Southeastern Africa, a branch of the great Bantu family. The name is now chiefly restricted to the tribes occupying the coast districts between Cape Colony and Delagoa Bay. They differ from the negroes in the shape of the head, it being more like that of Europeans; in the high nose, frizzled hair, and brown complexion, which becomes lighter in shade in the tribes of the more southern districts. They are a tall, muscular race, the average height being from 5 ft. 9 in. to 5 ft. 11 in., and frugal and simple in their habits. Their chief occupation is raising and tending cattle, and hunting; garden and field work is mainly performed by women. There are several distinct branches or families of Kaffirs; but the tribes which recent events have specially brought to the front are the Pondos, the Fingoes, the Zulus, and the Swazi. Kaffirs, especially of the Zulu tribe, are distributed in large numbers over Natal and Cape Colony, and have become to some extent civilized. Frequent hostilities have taken place between the British and one or other of the Kaffir tribes, beginning almost with the first acquisition by Britain of the Cape Colony. The first Kaffir war was in 1811–12, the next in 1818–19. In 1834–35 a serious Kaffir war was carried on, resulting in the expulsion of the Kaffirs beyond the Great Kei, but they were soon allowed to return. Another war (the fourth) broke out in 1846, and lasted nearly two years, with much suffering to both colonists and Kaffirs. Its result was an extension of territory in the north and east, a portion between the Cape Colony and the Kei being reserved for the natives, and called British Kaffraria. In 1850 a Kaffir outbreak took place, and a bloody war followed, ending in 1853, soon after which British Kaffraria was made a crown colony. A sixth war occurred in 1877–78, owing its origin to disputes between the two tribes of the Fingoes and Goalokas. For a subsequent war see *Zululand.*

Kaffraria, literally the country of the Kaffirs, a name once applied to a large part of Southeastern Africa, but now limited to the coast district stretching from the Cape Colony to Natal, recently brought under British control. A tract of land southwest of the Kei used to be known as British Kaffraria, but since 1865 it has formed two districts of Cape Colony, namely King William's Town, and East London.

Kafiristan' (or the country of Kaffirs) (infidels), a tract n. e. of Afghanistan, between India and the Hindu-Kush. It is very mountainous, especially the interior, and inhabited by a nation (the Siaposh) formed of different tribes, varying considerably in complexion. They live chiefly by cattle-raising and agriculture. Although hemmed in by Moslems, they have, excepting a few border tribes, resisted the spread of Islamism. Polygamy is practised, and they dress themselves in goat skins, or fabrics woven from goats' hair, black being the almost universal color.

Kaf'tan (or Caftan), a long vest or gown worn under a long, cloth coat in Turkey, Egypt, Persia, and other Eastern countries, tied round the waist with a girdle, and having long sleeves. Formerly the sultan presented state dignitaries and foreign ambassadors with a caftan as a mark of honor.

Kagoshi'ma, a town in Japan, at the southern end of the island of Kiushiu, on the Kagoshima Gulf. It was bombarded by a British squadron in 1863, and set on fire as a

punishment for the murder of some British subjects. Pop. 56,643.

Kailas (kī-läs′), a sacred mountain of the Hindus in the Himalayas, near the sources of the Indus and Sutlej; height 20,226 ft.

Kainite, a hydrous sulphate of potash and magnesia, found along with beds of rock salt, especially in Germany and Austria. It is valuable for the production of double sulphate of potash and magnesia, and is used as a manure.

Kairwan (kīr-wȧn′), a town of Tunis, 80 mi. s. s. e. of the capital, in a barren sandy plain, and surrounded by a wall. It ranks second only to Tunis in trade and population, and is one of the holy Mohammedan towns. Pop. 20,000.

Kaiser (kī′zẽr), the German word for emperor, from L. *Cæsar.*

Kaiserslautern (kī′zẽrz-lou-tẽrn), a town in the Bavarian Palatinate, on the Lauter. It has manufactures of woolens, cottons, hosiery, stoneware, and leather; breweries, glass works, paper and other mills, and important iron works. Pop. 31,449.

Kaka, a New Zealand parrot, or rather cockatoo, which, from feeding on fruits, vegetables, etc., has largely betaken itself to a flesh diet, and has become a nuisance by settling on the backs of sheep, and with its strong curved bill tearing out portions of their flesh.

Kalaha′ri, (or Kaliha′ri), a desert region in Central South Africa, north of the Orange River, a large tract of which is included in the British protectorate of Bechuanaland. It is very flat, subject to long continued droughts, and has only dried up river beds; nevertheless it is not devoid of vegetation, patches of grass and shrubs occurring here and there. An abundant supply of watermelons and some remarkable varieties of tubers, together with large herds of antelopes and other game, provide ample subsistence to the bushmen and Bakalahari inhabiting this barren region.

Kalamazoo, Kalamazoo co., Mich., on Kalamazoo River. Railroads: Michigan Central; South Haven, branch of the Michigan Central; G. R. & I.; C. K. & S.; and Lake Shore. Industries: several carriage concerns, two flouring mills, four iron foundries, factories for the manufacture of harrows, plows, wheels, brass fixtures, sleds, caskets, windmills, radiators, regalia, etc. Surrounding country agricultural. The site of the town was a trading post in 1820 and in 1829 was named Bronson after its founder, Titus Bronson. The name was changed to its present one in 1836, and it became a city in 1883. Pop. 1900, 24,404.

Kaleidoscope (ka-lī′-), a well-known optical toy invented by David Brewster, by which an infinite variety of symmetrical, and often beautiful, colored designs is obtained. The ordinary kaleidoscope consists of a tube containing two glass plates acting as mirrors, which extend along its whole length and make an angle of 60° with one another. One end of the tube is closed by a metal plate with a small hole at its center, to which the eye is applied; at the other end there are two plates, one of ground the other of clear glass (the latter being next the eye), with a number of pieces of colored glass or beads lying loosely between them. When the eye is applied to the aperture the mirrors produce a beautiful symmetrical figure, and when the tube is turned about or shaken new images, always symmetrical, are formed. This arrangement may be modified in various ways. The instrument has been used by designers of patterns for printed calicoes, etc.

Kalgan, a fortified town of China, province Chi-li, on the overland trade route between China and Russia. Caravans pass regularly through, conveying tea from Peking to Kiachta, and considerable quantities of Russian goods follow an opposite course. It produces considerable quantities of soda. Pop. est. at 100,000.

Kali, a Hindu goddess, one of the forms of the consort of Siva, and therefore in some respects corresponding to Durga and other deities. She is represented as black, with four arms, wearing a necklace of skulls, and the hands of slaughtered giants around her waist as a girdle. Her eyebrows and breast appear streaming with the blood of monsters she has slain and devoured. One hand holds a sword, another a human head. She is the goddess of death and destruction, and goats and other animals are sacrificed on her altars. Ancient Hindu books even enjoined human sacrifices to this bloodthirsty goddess. Her worship is said to be characterized by vile secret rites.

Kalisch (kā′lish) (or Kalisz), a town and province in Russian Poland, near the Prussian frontier. Area of province 4,392 sq. mi.; pop. 774,759. The town is an important trade center, and the capital of the province. Pop. 18,804.

Kal′mia, a beautiful North American genus of shrubs, with cup-shaped rose or purple flowers disposed in corymbs, and belonging to the natural order Ericaceæ, or heaths. The *K. latifolia,* commonly called *mountain laurel* or *calico bush,* much valued in European gardens for its flowers and foliage, has its home in the Alleghany Mountains. Its trunk sometimes attains a diameter of three in.; the wood is very hard, closely resembling box.

Kal′mucks, a nomadic and warlike Mongol race, originally natives of the territory of Central Asia between the Koko-Nor and Thibet, but now inhabiting not only parts of the Chinese Empire, but also occupying districts of Siberia and European Russia, where they settled under Russian dominion on the Ural, Don, and Volga, and in the government of Simbirsk. They have been great warriors from very early times, fought many bloody battles with the Tartars, with the Chinese, and among themselves, and made predatory expeditions as far west as Asia Minor, and as early as the eleventh century. Many of the Russian Kalmucks have been converted to Christianity. They are intrepid soldiers, splendid horsemen, and troops of them are attached to almost every Cossack regiment. Physically the Kalmucks are small of stature, broad-shouldered, with small, round

heads, and the narrow, oblique eyes characteristic of the Mongolian race. They number altogether perhaps 700,000, of whom more than half are under Chinese rule.

Kalu'ga, a town and government of European Russia. The gov. has an area of 11,942 sq. mi., and a population of 1,187,433. Iron ore and a poor kind of coal are raised. The town stands 114 mi. s.w. of Moscow, has rope and canvas factories, and trades largely with Germany in leather, oil, and candles. Pop. 40,252.

Kama, the largest tributary of the Volga, Russia; course 1,150 mi.

Kama (kä'ma), the Hindu god of love, corresponding, generally speaking, to the Greek Eros and Roman Cupid. He appears as a beautiful youth riding on a parrot, generally carrying a bow with a string formed of bees, and having five arrows, each tipped with a flower that is supposed to have some amorous influence. Dancing girls or nymphs bear him company, and one carries his banner, the emblem on which is a fish or marine monster on a red ground.

Kam'ala, a drug long known, under various names, to Indian and Arab physicians, as a specific against the tapeworm. It occurs as a brick-red powder, adherent to the fruit of the *Rottlĕra tinctoria,* formed by minute, roundish, semi-transparent granules, mixed with stellate hairs, and is largely collected in the forests of Madras, where it forms an important source of revenue. The active principle of the powder lies in the 80 per cent. of resin it contains, which also supply the coloring matter called *rotterin,* used as a silk dye. Another variety, exclusively employed as a dye, comes from the east coast of Africa, but differs from the Indian product in the deep, purple color, the coarseness of its particles, and the large simple hairs which are found mixed with it.

Kamenetz', a fortified town of Russia, capital of the government of Podolsk, on the Smotritz. Pop. 35,840.

Kamptee (käm-tē) (or Kamthi), a town of India, Central provinces, Nagpur district, with an extensive military cantonment, and a large trade. Pop. 50,987.

Kamptu'licon, a floor covering, first introduced to the general public in 1862. The best is made of india rubber, gutta-percha, and powdered cork. The first two ingredients are liquefied by naphtha or other solvent, the cork dust is then introduced, and the mixture, while still warm, flattened out by rollers into sheets of the desired length, width, and thickness. When hardened, patterns are printed on. It has the advantage of softness and warmth over ordinary oilcloth, and is the best substitute for a carpet; but the cost of the material used makes it expensive, and the cheaper linoleum has now largely superseded it.

Kamrup (käm-röp'), a district of Assam, in the Brahmaputra valley; area 3,857 sq. mi.; pop. 644,960.

Kamtchat'ka, a large peninsula in the northeast of Asia. Area 85,000 sq. mi. It is a Russian possession since 1706. The climate is very severe. The chief wealth of the country lies in its fur-producing animals, including the sable, the Arctic fox, the beaver, and the bear. The Kamtchadales, once the predominant race of the peninsula, are a branch of the Mongol family, a low type physically and morally; but they are rapidly vanishing before the Russian settlers. In 1886 they were stated to be under 2,000. Their food consists mainly of fish seasoned with whale and seal fat. They believe in a Creator and the immortality of the soul (including animals). They use dogs for draught purposes, and not the reindeer, like their neighbors. The Koryaks are a wandering tribe, living in the northern districts, and subsisting almost exclusively on the produce of the reindeer. The entire population is about 11,500. The capital, Petropaulovsk, has a pop. of about 1,000.

Kana'kas, the native inhabitants of the Sandwich Islands; in New Caledonia and the New Hebrides the name is applied to all the native laborers, without distinction of origin.

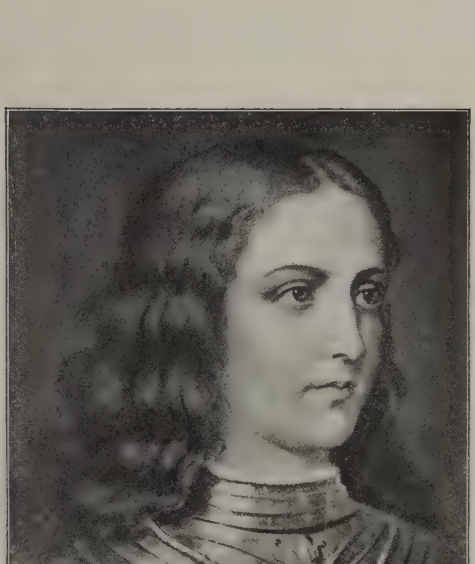
Kana'ri Oil, an oil yielded by the fruits of a tree of the Indian Archipelago and Southeastern Asia, often called Java almond. The oil is used for culinary purposes and for burning, and is deemed superior to cocoanut oil.

Kanaza'wa, a town of Japan, near the northwest coast of the island of Hondo (Niphon), with manufactures of silks, porcelain, etc. Pop. 104,320.

Kandahar' (or Candahar), a town of considerable commercial and strategical importance in the south of Afghanistan, on the direct route to India. The town lies 3,484 ft. above the sea, has a large transit trade, and a pop. of 60,000.

Kane, Elisha Kent (1820–1857), surgeon, traveler, and Arctic explorer. He graduated as M.D. at the University of Pennsylvania in 1842, was attached as surgeon to the American mission to China, and afterward visited India, Egypt, and Greece. In 1846 he rendered important service as a volunteer in the U. S. army in Mexico, in 1850 by his survey of the Gulf of Mexico, and in the same year joined the Grinnell Expedition, as medical and scientific member, in the unsuccessful search for Sir John Franklin. His observations led him to the belief that there was a large open sea near the pole, and with a view to penetrate it he organized and commanded a second expedition, which left New York in the *Advance* in May, 1853. He succeeded in getting as far as 78° 43′ n. lat., where he was frozen up for twenty-one months; and being harassed by scurvy and want of provisions was obliged to abandon the vessel. A perilous journey of 1,300 mi. in boats and sledges brought him back to Greenland, and he again reached New York in November, 1855. Much broken in health, he sailed for Cuba to recruit, but died there. The accounts of his two expeditions added much to our knowledge of the Arctic regions.

Kangaroo, the common name of a number of animals indigenous to Australia, and first made known to Europe by Captain Cook. The most noticeable feature about the kangaroo is



EMINENT WOMEN

Victoria
Joan of Arc

Elizabeth
Adaline Patti

Plate 21, Vol. III

the disproportion between the upper and lower parts of the body. The head is small, deer-like in shape, with large ears; the forelegs small and five-toed; the hind legs very large and powerful, with four toes only on the feet. The tail is long, thick at the base, and helps to support the animal when sitting erect, the usual posture when not feeding; it also assists the hind legs in their long leaps (from 10 to 15 ft.). The young are born very immature, and protected and nourished for about eight months in the *marsupium*, or pouch, into which the

The Great Kangaroo.

nipples of the mammary glands open. Kangaroos are herbivorous, and, where still plentiful, a serious pest to squatters. The hind-quarters of the large species supply a tolerable substitute for venison, while their tails make excellent soup, and their skins good rugs and leather. The kangaroo includes many species, varying in size from a hare to a large sheep, and remains of still larger and extinct species have been found in the pleistocene deposits of Australia. The larger and most common kinds belong to the genus *Macrŏpus*, and include the giant kangaroo, the red kangaroo, and the brush kangaroo.

Kangaroo Apple, a plant of the potato genus, belonging to Australasia and South America, with an edible fruit.

Kangaroo Island, a long and barren island, area 1,671 sq. mi., situated at the entrance to the St. Vincent Gulf, South Australia, 103 mi. from Adelaide.

Kangaroo Rat, more properly rat-kangaroo, a diminutive species of the kangaroo family, differing from the kangaroo proper in possessing canine teeth in the upper jaw, in their nocturnal habits, and their food, which chiefly consists of roots.

Kankakee, Kankakee co., Ill., on Kankakee River, 56 mi. s. of Chicago. Railroads: I. C.; C. C. C. & St. L.; I. I. & I.; Kankakee & Southwestern. Industries: two iron foundries, flour

mill, horse shoe nail factory and other manufactures. Surrounding country agricultural. The town was first settled in 1830 and became a city in 1854. Pop. 1900, 13,595.

Kano, a town in Central Africa, kingdom of Sokoto. Pop. est. at 30,000

Kansas, the *Sunflower State*, is the geographical center of the Union. It is bounded on the n. by Nebraska, on the e. by Missouri, on the s. by Indian Territory, and on the w. by Colorado. The state is nearly rectangular in shape; has a length from e. to w. of 400 m. and a width from n. to s. of 210 m., and covers an area of 82,080 sq. m. Pop. in 1900, 1,470,495.

Surface.—The surface is a series of rolling plains which increase in elevation from 750 feet on the eastern boundary to 3,300 feet on the western state line. The Missouri, which forms the northeastern boundary, is the only navigable river. Other large streams are the Kansas, Arkansas, Marais des Cygnes, Neosho, Big Blue, Smoky Hill, Republican, Saline and Cimarron. The larger rivers, as the Kansas and the Arkansas, are rivers of the plains with light banks and sandy beds; but many of the smaller streams have rock bottoms and supply abundant water power.

Climate.—The pure, dry air, the prevailing sunny weather, and the moderate altitude combine to make the climate both pleasant and healthful. The summer temperature is often high but the nights are invariably cool and refreshing. The winters are comparatively short, dry and mild, except during the periods when severe winds sweep over the open, unprotected surface of the country. The average temperature is 54°; the average annual rainfall, about 26.17 in.

Mining.—Bituminous coal is mined in most of the counties of the eastern part of the state from Brown co. to Cherokee. The most valuable beds are in Crawford co. The annual value of the output of the coal mines is over $5,000,000. Natural gas and petroleum are found in large quantities in many localities, especially in the southeast. The gas and oil belt covers about 8,500 sq. m. Iola, Cherryvale, Independence and Neodosha are centers of the industry. Salt is found in the central and western parts of the state. The beds cover an area of about 12,000 sq. m., with salt-mining centers at Hutchinson, Lyons, Kingman, Wellington and Sterling. Lead and zinc are profitably mined in the extreme southeast. This with a part of Missouri is known as the Galena-Joplin district, which produces a large percent of the lead mined in the U. S. The Galena mines produce more zinc than any other mines in the U. S. Gypsum, cement, lime-stone, building-stone and clays for brick tiles and pottery are found in various localities.

Agriculture.—Kansas is essentially an agricultural state. It ranks third in the production of cereals, yielding in 1899, 298,546,254 bushels. In the production of corn it ranked third and in wheat fifth. In 1901, the wheat yield on 5,316,482 acres was 90,333,095 bushels. Of hay and forage crops, exclusive of corn-

stalks, Kansas ranked first in tonnage in 1899. An enormous amount of sorghum cane is grown in the state. Other crops of importance are oats, potatoes, flax, rye, broom corn and barley. Many kinds of fruit are profitably grown, the apple nearly everywhere, and peaches and pears in the eastern and southeastern parts of the state. Kansas apples are among the finest in the world. Stock-raising is an important industry; in the production of domestic animals, the state ranks fourth. Vast herds of cattle are fed and fattened on the ranches and farms. From the ranches in western Kansas, cattle are shipped directly to London, and the markets of Mexico are supplied with horses.

Manufacturing. — Manufacturing and mechanical industries have had a considerable growth during the last forty years. Slaughtering and meat-packing is the most important industry. Kansas City is next to the largest meat-packing city in the world and has within its limits the largest single packing-house in existence. Other industries are flour and grist-milling, soap and candle-making, car construction and general shop-work, the smelting and refining of zinc, manufacture of butter, cheese and condensed milk and flour milling. Kansas City, Topeka and Wichita are the leading manufacturing centers.

Transportation.—There are now (1900) about 9,000 miles of railroad in Kansas. Four through lines cross the state from east to west, while three direct lines connect it with the ports of the Gulf of Mexico. Most of these lines converge at Kansas City and thus the state is brought into direct communication with all the seaports of the United States.

Education.—In each township two sections have been given to the common schools, and the sale of these lands forms the basis of the permanent school fund. The total amount of the fund for public schools and other state educational institutions is $8,702,680. The state maintains a university at Lawrence; an agricultural college at Manhattan, which ranks among the first in the United States; a normal school at Emporia; a school for deaf mutes at Olathe, and a school for the blind at Kansas City. There are also state reform schools, a Soldiers' Orphans' Home and state asylums for the insane. The state penitentiary is at Leavenworth.

History.—Kansas belongs to the immense tract of country purchased by the American government from France in 1803, known as the Louisiana purchase. Prior to 1854 it was in the hands of various Indian tribes, some native and others which had been removed from the older states. It was organized and opened for settlement as a territory in 1854. The question of slavery arose, and Kansas became the battle ground between the partisans of slavery and freedom. Collisions became numerous, and robberies and murders were committed. John Brown took part in the civil war which prevailed, and many fierce conflicts took place. Kansas was admitted into the Uuion as a free state in 1861. The state suffered greatly during the Civil War, but at its close immigration poured in at a rapid rate, and since then a career of uninterrupted prosperity has been enjoyed. The principal cities are Topeka, the capital, population in 1900, 33,608; Kansas City, 51,418; Wichita, 24,671; Leavenworth, 20,735; Atchison, 15,722.

Kansas, University of, a State institution of learning established at Lawrence, Kan., in 1864. It comprises a college of liberal arts, a graduate school, departments of law, medicine, pharmacy, engineering, and art, and the University Geological Survey. In 1904 the faculty numbered 105 and the students 1300. The library contains 42,000 volumes and the natural history collection is valued at $200,000. The chancellor is F. Strong.

Kansas City, Jackson co., Mo., at junction of Kansas and Missouri rivers, adjoining Kansas City, Kansas (which see). It is a great railroad city and commercial center. All the great western trunk lines center here. It has large stockyards and trade in live-stock and great pork-packing houses. Coal, lead and iron ore are found in the vicinity. Manufactures include railroad iron, car wheels, flour, linseed oil, candles, provisions, agricultural implements, lumber and coal. The city has one of the largest smelting works in the U. S. The principal buildings are the U. S. Government buildings, the Board of Trade, Kansas City club, Y. M. C. A. buildings, Public Library and a Convention Hall with seating capacity of 15,000. Pop. 1900, 163,752.

Kansas City, Wyandotte co., Kan., at conjunction of Kansas and Missouri rivers. The city has common commercial interests with Kansas City, Mo. (which see). Among the railroads are Missouri Pacific and Union Pacific. Industries: stockyards and meat-packing establishments, which, together with those of Kansas City, Mo., are the second largest in the country; flour and planing mills, oil tanks, box and basket factories, cement works and car shops. The city has the largest single packing-house in the world. It is a great meat-exportiug point and has, together with Kansas City, Mo., the principal grain-market west of the Mississippi river. Natural gas and coal underlie the city. It is the seat of the State Institution for the Blind. Pop. 1900, 51,418.

Kansas River, a river of Kansas, formed by the junction of the Solomon and Smoky Hill (the latter rising in the Rocky Mountains), traverses the state in an easterly direction, and falls into the Missouri near Kansas City.

Kant, Immanuel (1724–1804), a celebrated German philosopher, the founder of the "critical" or Kantian philosophy, b. at Königsberg, Prussia. He early showed great application to study, and was sent to the Collegium Fredericianum, and then (in 1740) to the university of his native city. He was appointed one of the teachers in the Königsberg University, and lectured on logic, metaphysics, mathematics, and natural philosophy, to which, at subsequent periods, he added natural law, moral philosophy, natural theology, and physical geography. In 1770 he became a

full professor, obtaining the chair of logic and metaphysics, a post that he occupied until 1797. According to him, part of our knowledge is knowledge *a priori*, or original, transcendental, and independent of experience; part of it is *a posteriori*, or based on experience. What he calls the "pure reason" has to do with the former. His great work named the *Critique of Pure Reason*, contains the foundation for his whole system of philosophy. In the preface to a later work, the *Critique of the Power of Judgment*, he defines "pure reason" thus: Pure reason is the faculty to understand by *a priori* principles; and the discussion of the possibility of these principles, and the delimitation of this faculty, constitutes the critique of pure reason. In the first rank of such ideas as we do not derive from experience are *space* and *time*. Kant shows that all our perceptions are submitted to these two *forms*, hence he concludes that they are within us, and not in the objects; they are *necessary* and *pure intuitions* of the internal sense. The three original faculties, through the medium of which we acquire knowledge, are *sense*, *understanding*, *reason*. Sense, a passive and receptive faculty, has, as already stated, for its forms or conditions *space* and *time*. Understanding is an active or spontaneous faculty, and consists in the power of forming conceptions according to such categories as unity, plurality, causality, etc., which categories are applied to objects of experience through the medium of the two forms of perception, *space* and *time*. Reason is the third or highest degree of mental spontaneity, and consists in the power of forming ideas. As it is the province of the understanding to form the intuitions of sense into conceptions, so it is the business of reason to form conceptions into ideas. Far from rejecting experience, Kant considers the work of all our life but the action of our innate faculties on the conceptions which come to us from without. He proceeds in a similar way with morality; the idea of good and bad is a necessary condition, an original basis of morals, which is supposed in every one of our moral reflections, and not obtained by experience. He treats this part of his philosophy in his *Critique of Practical Reason*.

Ka'olin, a name first given by the Chinese to a pure white clay used by them in the manufacture of porcelain. Kaolin is the result of the decomposition of granite rock, containing feldspar, mica, and quartz. Similar clays, differing slightly in color and in the percentage of constituents, are found at Schneeberg in Saxony, furnishing the material of Dresden china; at Limoges, in France, employed for Limoges ware; and at St. Austell, in Cornwall, the source of supply for the British potteries. It is also found in Nebraska and some of the Eastern states. In its natural state kaolin somewhat resembles mortar; by sorting and repeated filtration it is freed from all coarse ingredients, then dried in pans and sheds, and sent into the market cut into blocks.

Karako'rum, a mountain range in Central Asia forming a sort of rampart between Cashmere and Eastern Turkestan, also a pass in this range, 18,000 ft. above the sea level, on the direct road from India to Turkestan.

Karauli', a town of India, in Rajputána, capital of native state of same name, surrounded by walls and a moat, and containing a palace, handsome temples, etc. Pop. 25,607.

Ka'rens, a pagan tribe of Burmah, formerly confined to a region beyond the Salween River, called Karen-ni, on the borders of Burmah and Siam, but now distributed over various parts of Burmah. They are an intelligent and industrious race, many of them having become Christianized, chiefly through the agency of American missionaries. They are estimated at about 100,000, but the Karen dialect is stated to be spoken by six times that number.

Karikal' (or Carical), a small French settlement in India, in the Carnatic, on the Coromandel coast, 150 mi. s. of Madras. Area 62 sq. mi.: pop. 92,516. KARIKAL, the capital, on the Cavery delta, has a pop. of 21,315, and a large export trade, chiefly in rice.

Karli', a celebrated Buddhist cave temple of India, Poonah district of Bombay Presidency. It is rich in sculpture, and is divided like a church into nave and aisles, with an apse.

Karlsbad, Karlsruhe, Karlstadt, etc. See *Carlsbad*, etc.

Karnal (kar-näl'), an Indian town and district, in the Punjab. Area of district 2,396 sq. mi.; pop. 622,621. KARNAL, the headquarters of the district, trades largely with Delhi and Umballa. Pop. 27,022.

Karnul' (or Karnool'), a town in India, in the presidency of Madras, situated in the fork formed by the junction of the Hundri with the Tungabhadra, with a dismantled fort. Pop. 20,329. The district has an area of 7,788 sq. mi.; a pop. of 709,305.

Karr, JEAN BAPTISTE ALPHONSE (1808–1890), a French journalist and romance writer. In 1832 appeared his first novel, *Sous les Tilleuls*, originally written in verse, and which at once brought him into notice. Numerous other works followed in rapid succession, and he also contributed largely to journals and reviews, including the *Revue des Deux Mondes*. In 1835 he became editor of the *Figaro*, and in 1839 commenced in it the fortnightly *Guêpes* ("Wasps"), a publication which attracted much attention for a time by its witty and humorous anecdotes and character sketches, and brought him considerable profit and much ill-will. In 1855 he retired to Nice, where he finally became an enthusiastic grower of fruit and flowers.

Karri, a valuable timber largely exported from Western Australia, and obtained from an enormous tree belonging to the Eucalyptus family.

Karroos, the name given in South Africa to the elevated table-lands, 3,000 to 4,000 ft. above sea level, lying between the mountain ranges. The soil is shallow but rich, and during the rainy season, or when artificially watered, vegetation is most profuse. The Karroos form excellent pasturage for cattle, sheep, and An-

gora goats; and great tracts are now occupied as farms, the uncertain rainfall being supplemented by permanent springs and large reservoirs. The "Great Karroo," in Cape Colony, extends from east to west for 300 mi. with a breadth of 70 mi.

Kartike'ya, the Hindu god of war. He is represented riding on a peacock, with six heads and twelve hands, in which numerous weapons are brandished.

Kaschau (kâ-shou') a town of Hungary, capital of the county of Abaujvar. It is beautifully situated, surrounded by vineyards, and one of the best built towns in Hungary. Pop. 26,422.

Kashan', a town of Persia, province of Irak-Ajemi, in a fertile plain 90 mi. s. from Ispahan. It is regularly built, has many fine mosques, etc., and its silks, carpets, jewelry, etc., are much esteemed. Pop. 22,000 to 30,000.

Kashgar', a Chinese town of Central Asia, in Eastern Turkestan, on a river of the same name, with considerable manufactures of cotton, linen, gold and silver cloth, carpets, etc., and an extensive trade. Pop. est. at from 40,000 to 80,000.

Kashkar, a large species of sheep inhabiting the lofty plateaus of Central Asia. The male has very large horns bent circularly, while the female has horns resembling those of a goat.

Kashmir. See *Cashmere.*

Kastamu'ni, a town of Asia Minor, capital of the Turkish vilayet of its own name, 100 mi. n.n.e. of Angora, with manufactures of printed cottons and copper wares, dye works, etc., and a trade in Angora goat's hair. Pop. est. at 40,000.

Kat'rine, Loch, a picturesque and much frequented lake, Scotland, county of Perth, 5 mi. e. of Loch Lomond.

Kattywar (or Káthiáwâr) (kät-hi-ä-wär'), a peninsula of Hindustan, Bombay Presidency, between the Gulf of Cambay and the Runn of Cutch. Cotton is the principal crop. Area about 22,000 sq. mi.; pop. 2,500,000.

Ka'tydid, a species of grasshopper of a pale green color, body about an inch long, found in some parts of North America, and so named from the sound of its note. This is produced by the friction of the taborets in the triangular overlapping portion of each wing cover against the other, and is strengthened by the escape of air from the sacs of the body, so as to be heard on a quiet night at a quarter of a mile distant. The females are noiseless.

Kaulbach (koul'bâh), Wilhelm von (1805–1874), one of the greatest of modern German painters. He studied at the art academy of Düsseldorf under Cornelius, and subsequently succeeded in the Munich academy. His most ambitious pictures, with the exception of the *Madhouse,* are to be found in a series (utilized in the decoration of the Berlin Museum) seeking to depict the progress of the human race in typical scenes from the great historic periods, and comprising the *Tower of Babel, Age of Homer, Destruction of Jerusalem, Battle of the Huns and Romans,* the *Crusades,* and the *Reformation.* As a colorist he was of inferior rank, his main strength lying in form and composition.

Kauri Pine, a tree peculiar to New Zealand, and found there only at the northern extremity of the North Island. It reaches the height of 150 ft., and its timber is much valued for building purposes, for making furniture, etc., but unfortunately the supply is not likely to hold out long. The resin of this tree, the kauri gum, forms a valuable export, and is used in making fine varnish, etc. Most of it is obtained in a fossil state, by digging.

Kazan', a city of European Russia, capital of the gov. of same name, situated on the Kasanka, about 4 mi. above its junction with the Volga. It is an extensive city, strongly fortified, with large wool-combing, weaving, and dyeing establishments, tanneries, and soap works, and a government dockyard in its vicinity. The timber, flour, and hemp fairs of Kazan are of the largest in the Russian Empire. The university is a great seat for Oriental learning, with nearly 1,000 students. Pop. 134,359. The government is surrounded by the governments of Viatka, Orenburg, Nijni-Novgorod, and Simbirsk. Area 24,601; pop. 1,992,985.

Kazan'lik, a town of Eastern Roumelia, at the foot of the Balkans. Pop. 20,000.

Kaz'vin, a town of Persia, prov. Irak-Ajemi, 90 mi. n.w. of Teheran. It has been greatly devastated by earthquakes, but has still a considerable trade. Pop. 25,000.

Kean, Charles John (1811–1868), an English actor, son of the celebrated Edmund Kean. He was educated at Eton. In 1830 he visited America, established his reputation, and reappeared as a leading actor in London in 1838, among his parts being Hamlet and Richard III. He married the accomplished actress Ellen Tree in 1842, revisited the U. S. in 1845, and in 1851 became sole lessee of the Princess' Theater, London, where he put some of Shakespeare's plays on the stage with a splendor never before attempted. In 1863 he made a tour to Australia, California, Jamaica, the U. S., Canada, etc., which proved a great financial success. On his return he continued to play in London and the provinces until a short time before his death. He inherited little of his father's genius, and his success was largely due to effective staging.

Kean, Edmund (1787–1833), the most brilliant tragic actor of his age. His parents were poor and connected in a low capacity with the theatrical profession. At two years of age he was placed in a pantomime, at seven he went to school, but ran away, and for a short time he was a cabin boy in a vessel. Returning to the boards he ultimately obtained an engagement at one of the minor London theaters. When not yet thirteen years of age he managed to please his country audiences as Hamlet, Cato, etc., and in Windsor he gained the applause of the royal family in *Richard III.* In 1814 he appeared at Drury Lane as Shylock and Richard III. His success was sudden and unexampled, and was equally great in other parts, including Othello, Hamlet, Macbeth,

Iago, Lear, etc. He made his last appearance in *Othello* in 1833.

Kearney, General Philip (1815–1862), b. in New York City. He entered the service in 1837 and two years later went to France to study the tactics of the French cavalry. In 1840 he was made aid to General Macomb, and was on the staff of General Scott from 1841 to 1845. He took an active part in the Mexican War, and in 1861 re-enlisted in the Union army and was killed at Chantilly in September, 1862.

Kearney, Buffalo co., Neb., in the Platte River Valley. Railroads: Union Pacific; Burlington & Missouri Valley; and the Kearney & Black Hills. Industries: flour mills, foundry and machine shops, pickling, canning, and cracker factories, brick yards. It is an important grain shipping point. Population 1900, 5,634.

Keats, John (1795–1821), an English poet, was the son of a livery stable proprietor. In 1803–9 he was at a school at Enfield, after which he was apprenticed to a surgeon. His first volume of poems came out in 1817. *Endymion, a Poetic Romance*, appeared in 1818; his last volume of poetry, containing *Lamia, Isabella, The Eve of St. Agnes, Hyperion*, and other poems in 1820. By this time he had become so ill of consumption (inherited from his mother) that he was advised to seek a warmer climate; but it was too late, and though he reached Rome he only survived a short time. Shelley honored his memory by his elegy *Adonais*. Pl. 7, Vol. I.

Kecskemet (kech'ke-met), one of the largest market towns of Hungary, 50 mi. southeast of Budapest. It has an extensive trade in horses and cattle, and much-frequented fairs. Pop. 46,505.

Keel, the bottom timber in a wooden vessel which forms the main support and connection of the whole fabric. It is generally composed of several thick pieces of timber placed lengthwise, scarfed and bolted together. A piece bolted to the bottom of the keel is called the *false keel*, and an internal piece, also bolted to the keel, is called the *keelson*. In iron vessels the arrangement of parts is altogether different.

Keene, Cheshire co., N. H., on Ashuelot River, 92 miles n.w. of Boston. Railroads: Boston & Maine (two branches, Manchester & Keene, and Connecticut River). Industries: shoe factory, iron foundry, woolen mill, locomotive repair shops, chair, furniture, box, glue, toy, and many other factories. The town was first settled in 1736 and became a city in 1874. Prior to 1753 the town was called Upper Ashuelot. Pop. 1900, 9,165.

Keighley (or Keithley) (kē'lā, kēth'lā), a municipal borough of England, W. Riding of York; the headquarters of the worsted spinning trade. There are also several paper and corn mills, machine and tool factories. Pop. 30,811.

Kelp, in commerce, the crude alkaline substance obtained by burning seaweeds. The seaweed is gathered during the summer, dried on the shore, then stacked under shelter for some weeks until it becomes covered with a white saline efflorescence, when it is ready for burning, which is effected in a round brick-lined pit, or oblong kiln. As the weed softens, it is well stirred with a heated iron until it becomes a semi-fluid mass; it is then cooled and broken into pieces ready for the market. When salt was dear, the bulk of soda used in soap making was obtained from kelp and barilla, and the kelp manufacture was a source of large profit in Ireland, Scotland, and the Hebrides; but since soda can be manufactured from salt much cheaper, it has ceased to be a flourishing industry. Kelp is now chiefly used for the production of iodine and chloride of potassium; a ton of kelp yields about 8 lbs. of iodine.

Kelung', a town and seaport of China, in the northern part of the island of Formosa. Coal fields are worked by the Chinese in the neighborhood, and large quantities of coal are exported. There is also an extensive export trade in rice, sugar, and camphor. Pop. 70,000.

Kemble, Frances Anne (1809–1893), popularly known as Fanny Kemble, writer and actress, eldest daughter of Charles Kemble, and niece of Mrs. Siddons. She was induced to appear on the stage in 1829 at Covent Garden as Juliet. Her trip to America in company with her father was also a splendid triumph. She returned to London in 1847, and from that time resided alternately in America, England, and the Continent, appearing at intervals as a public reader. Of her most successful writings are the tragedy *Francis I; Journal of a Residence in the U. S.; Journal of a Residence on a Georgia Plantation; Records of a Girlhood;* and her notes on some of Shakespeare's plays. As an actress she excelled in the characters of Portia, Beatrice, Lady Macbeth, Lady Teazle, and of Julia in the *Hunchback*.

Kemble, John Philip (1757–1823), one of the most eminent tragedians of the British stage. Being intended for the church he was sent to the Roman Catholic college of Douay (France); but, in spite of his parents' opposition, he selected the stage as a profession, made his first appearance at Drury Lane in 1783, and became at once popular. From 1801 to 1803 he made a most successful tour in France and Spain, and on his return to London purchased a share in the Covent Garden Theater, and made himself a splendid reputation in the characters of Julius Cæsar, Hamlet, Macbeth, Coriolanus, etc. He abandoned the stage in 1817, and received many tokens of esteem from his numerous admirers on that occasion. His statue was placed in Westminster Abbey in 1833. His acting was distinguished for dignity, precision, and studious preparation, but was wanting in fire and pathos. His sister, Sarah, was the celebrated Mrs. Siddons.

Kempis, Thomas A. See *Thomas à Kempis*.

Ken'ilworth, a town of England, in Warwickshire, 4 mi. n. of Warwick. Kenilworth Castle, now a magnificent ivy-covered ruin, was founded in the reign of Henry I. The gorgeous entertainment given here in 1575 to Queen Elizabeth by the Earl of Leicester is familiar

to all from Scott's romance of *Kenilworth.* Pop. 4,173.

Kennebec, a river of Maine, rises in Moosehead Lake, and after a course of 150 mi., mostly e. s. e.. empties itself into the Atlantic 12 mi. below Bath. It is navigable for ships as far as Bath, for steamers to Hallowell, 40 mi.

Kenosha, Kenosha co., Wis., 50 mi. n. of Chicago. Railroads: C. & N. W., and Chicago and Rockford division. Industries: wire mattress co., wagon works, tannery, brass works, bicycle works, iron foundry, hosiery, malting, and other factories. Surrounding country agricultural and dairy. The town was first settled in 1835. Pop. 1900 11,606.

Kent, a maritime county of England; area 995,392 acres. Kent is the principal hop county, but large crops of wheat, barley, beans, and peas are also raised, and the cultivation of fruit, flowers, and vegetables is carried on extensively, London offering a near and ready market for this kind of produce. Kent has justly been termed the "Garden of England." Its chief manufactures are paper, chemicals, and gunpowder, and there are also some calico printing and bleaching works. The county town is Maidstone; other towns are Canterbury, Rochester, Chatham, Greenwich, Deptford, Woolwich, Gravesend, Dover, Folkestone, Hythe, Ramsgate, and Margate. Pop. 1,142,281.

Kent, James (1763–1847), an eminent American jurist. He was educated at Yale College, studied law, and was admitted to the bar in 1785. After practising at Poughkeepsie he settled in New York, and became professor of law at Columbia College (1794–98). He was successively appointed master in chancery, recorder, judge of the Supreme Court, chief justice (1804–14), and latterly chancellor of New York (1814–23). He again accepted the law professorship at Columbia College in 1824–25. His *Commentaries on American Law* (1826–30, at once became a standard work, while his decisions were quoted in the courts as of the highest authority.

Kenton, Hardin co., O., on the Scioto River. Railroads: C. C. C. & St. L.; Toledo & Ohio Central; and Indiana, Bloomington, & Western. Industries: saw and planing mills, straw board factories, and bee keepers' supplies. The largest iron fence factory in the U. S. is situated at Kenton. Pop, 1900, 6,852.

Kentucky (ken-tuk'i), the *Blue Grass State,* an East Central state, is bounded on the n. by Illinois, Indiana and Ohio; on the e. by West Virginia and Virginia; on the s. by Tennessee; on the w. by Missouri. Its greatest length from e. to w. is about 500 m.; from n. to s. about 180 m.; gross area, 41,263 sq. m. Pop. 1900, 2,147,174, of which 284,706 were colored.

Surface.—Kentucky is divided into several well-marked physical regions. In the bluegrass region lying north of a semicircular line drawn from Vanceburg to Louisville and passing through Junction City, the surface, 800 to 1,000 feet above the sea, is gently rolling. Bounding on the e., s. and w. of this region is a strip of country, "the Knobs," named from its conical-shaped sandstone hills rising to a height of 1,200 to 1,300 feet above the sea-level. All the state e. of a line drawn from opposite Portsmouth to the Wayne-Clinton county line is commonly called "the Mountains." This portion is a deeply dissected plateau with the Pine and Cumberland mountains on its southeast border. The general height of the plateau slopes from 1,500 to 1,000 feet. Some of the mountains rise into peaks 3,000 feet above the sea. Then there are the western coal fields, a rugged, broken surface, and east of them the so-called "barrens," which are now under cultivation. Kentucky is well watered. The general course of the rivers is northwest into the Ohio, which separates Kentucky from Illinois and Indiana. The Big Sandy, the Licking, the Kentucky, the Green, the Cumberland and the Tennessee rivers flow into the Ohio. Only a few small streams empty into the Mississippi, which flows along the western border. Caverns are numerous in the upper Green river country. Mammoth Cave in Edmonson county is one of the wonders of the world.

Climate.—The climate is variable but healthful and pleasant. The mean annual temperature is about 55°, and the average annual rainfall 46 in. Snows are light and seldom remain long upon the ground. Southerly to westerly winds prevail.

Mining.—The mineral wealth consists mainly in the coal and iron of the eastern and western coal fields. Kentucky was once the fourth state in the Union in the production of iron, but the industry has languished greatly in recent years. The coal production of 1900 was the largest in the history of Kentucky, 5,020,675 tons. There are great coal resources still undeveloped. Fluorspar and baryta, lead and zinc are mined in small quantities. The production of oil is not large, but constant. Natural gas is found in several counties. Salt is obtained from brine springs and wells. Valuable beds of building stone occur in various portions of the state. Mineral waters are furnished by springs and wells in all parts of the state.

Agriculture.—Stock-raising, particularly the breeding of fast horses, is the distinguishing feature of the bluegrass counties. Tobacco is a staple product. Kentucky ranks seventh as a corn-producing state. Other productions are oats, wheat, potatoes, hay, rye and hemp. Fruit-growing is an industry in the Ohio river counties from Cincinnati to Louisville and along "the Knobs." Large areas are still covered with forests of hardwood.

Manufactures.—Reports show a great increase in manufactures and mechanical industries during the last half century. The manufacture of tobacco is the most important industry, Louisville being the leading leaf-tobacco market of the world. Other manufactures in order of importance are flour and gristmill products, lumber and timber products and distilled liquors. Logging is an extensive industry on the upper waters of the Cumberland, Kentucky and Licking rivers,

where large saw-mills are located. A large industry is the making of malt and distilled liquors. The product is almost wholly corn whiskey, known to the trade as "Bourbon."

Transportation.—The great railroad systems of Kentucky are the Louisville and Nashville, Chesapeake and Ohio, Illinois Central and Cincinnati Southern. Lack of transportation facilities up to a recent date has delayed the development of coal fields and iron deposits. A number of branch lines of the systems named are being constructed and several more are projected. Several of the large rivers, chiefly the Kentucky and the Green, have been made navigable by dams and locks. The Ohio along the northern border and the Mississippi on the west furnish access to the great river system of the central valley of the United States, but Kentucky has very little direct foreign commerce. Louisville is the chief port of delivery. The principal exports are hemp, flax, tobacco, horses, mules, hogs, cattle, bagging and rope.

Education.—Kentucky has a permanent school fund and a school income derived from general and special taxes. There are separate schools for white and colored pupils. Until recently salaries paid to teachers have been small, hence teachers in the public schools have often been incompetent, especially in the colored schools. Recently an increased interest in education has developed and more teachers are taking special training in the normal schools. There are several private and public normal schools in the state, the Southern Normal at Bowling Green having the largest number of students. Most of the larger towns have high schools; those at Lexington and at Louisville maintain a high standard of excellence. Kentucky University at Lexington was founded in 1798. Other important educational institutions are the Agricultural and Mechanical College at Lexington, Centre College at Danville, Central University at Richmond, and the Kentucky Wesleyan College at Winchester. There are manual training schools at Frankfort and Louisville. The asylum for the blind is at Louisville, the institution for deaf mutes at Danville, asylums for the insane at Anchorage, Lexington and Hopkinsville, and an institution for the feeble-minded and the state penitentiary at Frankfort.

History.—Kentucky was formerly a portion of the western territory of Virginia. Numerous remains indicate that the Moundbuilders lived here in considerable numbers, but at the time of its first occupation by the whites the region was a hunting ground visited by both the northern and southern tribes of Indians and not permanently occupied by settlements. The early history of Kentucky reads like a romance. Since the day of Daniel Boone, Kentucky settlers and soldiers have been noted for their bravery and love of adventure. In 1769, Boone, with five companions, visited the region; in 1770, James Knox made extensive surveys; in 1774, log cabins were built by white men; in 1775, Boone built Ft. Boonesboro, and permanent settlements were made at Harrodsburg, Stanford and Louisville. In 1776, Kentucky was organized as a Virginia county and remained so throughout the Revolution; in 1790, it was made a separate territory of the United States, and in 1792, was admitted to the Union. Under the first constitution, which was in force until 1800, Indian wars troubled the settlers on the frontier. They had also to contend with Spanish, French and British intrigues. Under the second constitution (1800–1850) the money question was a cause of great anxiety. In 1833, the Legislature first began to authorize banks upon sound financial principles. The third constitution was enacted in 1850 and in 1891, the present constitution was adopted. During the Civil War, Kentucky remained in the Union and furnished men for both armies. The battles of Mill Spring, Perryville and Richmond were fought in Kentucky, The principal cities, with their population in 1900, are Frankfort, the capital, 9,487; Louisville, 204,731; Covington, 42,938; Newport, 28,301, and Lexington, 26,369.

Kentucky River, a river of the U. S., rises in the Cumberland Mountains, traverses the state of Kentucky, and after a course of 260 mi. flows into the Ohio at Carrollton. By a series of improvements the lower portion has been rendered continuously navigable for steamers

Kentucky University, an institution of higher learning at Lexington, Ky., founded at Georgetown in 1837. It comprises besides the College of Liberal Arts, College of the Bible, the Commercial College and the Medical Department (at Louisville). In 1904 the university had an attendance of 1,166 and a faculty of 64.

Keokuk, Lee co., Ia., on the Mississippi River. It has seven railroads, including C. B. & Q. The ship canal at this point can accommodate the largest vessels. Here are located stove, malleable iron works, starch, and barbed wire factories, egg packing establishments, etc. It has a medical college and other institutions of learning. Pop. 1900, 14 641.

Kepler, JOHANN (1571–1630), a great German mathematician and astronomer. He studied at the University of Tübingen, and in 1593 he was appointed a teacher of mathematics at Gratz (Styria). Here he devoted himself with much ardor to the study of astronomy; but in 1599 the religious persecutions commenced in Styria, and Kepler, being a Protestant, gladly accepted Tycho Brahe's invitation to Prague, to assist in the preparation of the new astronomical tables, called the Rodolphine Tables. Tycho d. in 1601, and Kepler continued the work alone, being appointed imperial mathematician and astronomer. After twenty-five years' incessant labor the tables were published in 1627 at Ulm. Kepler had become the happy possessor of all Tycho's papers, and the mass of observations made by that astronomer during twenty years, with a precision till then unsurpassed, enabled Kepler to establish his three laws which have proved so fruitful in the development of astronomical

science. The latter part of his life was chiefly passed at Linz as professor of mathematics. He wrote much, but the work that has rendered him immortal is his *New Astronomy, or Celestial Physics delivered in Commentaries on the Motions of Mars.*

Kepler's Laws, in astronomy, three laws discovered by Kepler on which were founded Newton's discoveries, as well as the whole modern theory of the planets: 1, Every planet describes an ellipse, the sun occupying its focus. 2, The radius vector (line joining the center of the sun with the center of the planet) of each planet sweeps over equal areas in equal times. 3, The squares of the periodic times (the periods of complete revolution round the sun) of two planets are proportional to the cubes of their mean distances from the sun. These laws enabled Newton to determine the laws of the attraction of gravitation.

Kermanshah' (or Kirmanshahân'), a town in Persia, province of Ardilân. The manufactures consist chiefly of carpets; the trade, chiefly transit by the routes from Bagdad, Shuster, and Ispahan, is considerable. Pop. about 35,000.

Kermes (ker'mēz), the dried female insects of the species *Coccus ilicis*, found in many parts of Asia and South Europe on the leaves of a species of oak shrub, and supplying a durable red and scarlet dye. They have been utilized for dyeing purposes in the East from very ancient times, and in Germany and Spain since the Middle Ages; but since the introduction of cochineal their use is confined to the Eastern countries and Spain, where the collection of these insects still gives employment to a number of people.

Ker'osene, an illuminating oil obtained by refining crude petroleum. The bulk of kerosene is supplied by the U. S. and Russia. America controlled the kerosene market for many years, but Baku, on the Caspian, has now become a formidable rival, not only driving American kerosene out of the Russian market, but also supplanting it in other countries.

Ker'sey, a strong, coarse woolen cloth, generally ribbed, and formerly largely manufactured in Germany, France, and the north of England, for riding and hunting suits, but now chiefly used in liveries for the parts exposed to extra strain and wear.

Ker'seymere (or Cassimere) (from the town *Cashmere*), the name given to a light fabric woven from the finest wools, principally in the west of England, and at Elbeuf, France. It is chiefly used for ladies' jackets and gentlemen's gaiters.

Kertch (or Kerch) (ancient *Panticapæum*), a fortified seaport town of Russia, in the Crimean Peninsula, on the Strait of Yenikale, connecting the Sea of Azof with the Black Sea. The modern town is of quite recent existence; it is well built, advantageously situated for commerce, and has a rapidly growing trade. Pop. 27,318.

Kestrel (or Windhover), a species of the falcon tribe, widely distributed in Europe. It is remarkable for its habit of remaining suspended in the air by means of rapid wing motion, being at this time on the lookout for mice, which are its chief food. At times it will also eat small birds and insects frequently. It varies from 12 to 15 in. in length; it nests in

Kestrels: 1, the male; 2, the female.

trees, also in old towers and buildings, and often utilizes an old crow's nest. In winter it migrates to North Africa and India.

Ketchup (or catsup), said to be derived from the Japanese *kitjap*, a pungent sauce first introduced from the East, and employed as a seasoning for gravies, meat, and fish. It was formerly prepared from mushrooms only, but numerous other products are now used for the same purpose. The best ketchup is obtained from mushrooms, walnuts, and tomatoes; instruction for its preparation may be found in almost every cookery book.

Kewanee, Henry county, Ill., 131 m. s. w. of Chicago, on the C., B. & Q. railroad. Industries: iron foundries, agricultural implement, house-heating apparatus, tube, pump and bottling works. It is in an agricultural and bituminous coal mining region. The town was settled in 1854 and became a city in 1896. Pop. 1900, 8,382.

Kewatin (kē-wat'in) (or Keewatin), a large Canadian territory under the jurisdiction of Manitoba, and stretching from Manitoba and Ontario to Hudson's Bay.

Kew-Kiang (or Kiu-Kiang), a town and seaport of China, province Kiangsi, on the south bank of the Yang-ste-kiang. Its situation is not favorable for an extensive commercial port, but derives importance from its connection with the green tea districts. Pop. 50,000.

Key, Francis Scott (1780–1843), author of *The Star-spangled Banner*, was b. in Maryland, practised law at Frederick City and at Washington, and became district attorney for the District of Columbia. It was during the British invasion in 1814, at the attack on Baltimore, which he witnessed from an English man-of-war, that Key, after watching through the gray dawn to see which flag floated over

the ramparts of Fort McHenry, wrote the words which have kept his name alive. A collection of his poems appeared in 1857. There is a handsome monument by Story, erected at the expense of James Lick, at San Francisco.

Key West, county seat of Monroe co., Florida, also port of entry and United States naval station; on the island of Key West. It has a fine harbor which several lines of steamers enter. The chief industry is the manufacture of cigars. Exports are cigars, sponges, turtles, fruit and vegetables. Population 1900, 17,114.

Khan, a title given by Tartars, Persians, and other Eastern nations to princes, chieftains, commanders, and governors, but now generally reserved for governors of cities and provinces, these provinces being called *khanates.* Khan is also another term for caravansary, of which there are two kinds one for pilgrims and travelers, with gratuitous entry, another, more commodious and with locked apartments, for traders, subject to a nominal charge.

Khandesh (khän-däsh'), a district of British India, Bombay Presidency, forming the most northerly portion of the Deccan tableland, and intersected by the Tapti River; area 9,944 sq. mi; pop. 1,237,231.

Kharkoff (*khär*-kof') (or Charkov), a government of the south of Russia; area 21,041 sq. mi.; pop. 2,243,463. The capital, Kharkoff, situated at the confluence of the Kharkoff and Lopan, has a considerable trade in cattle, grain, etc., and manufactures beet sugar, soap, candles, and leather. A bed of coal of immense extent in its vicinity is doing much to foster industries. The University of Kharkoff is an important educational center. Pop. 171,416.

Kharput (*khär'*put), town of Turkish Armenia, 60 mi. n. of Diarbekir. It is noted for its castle and other ruins. Pop. 25,000 to 30,000.

Khartum (*khär*-töm'), a town in the Eastern Sudan, on the left bank of the Blue Nile, near its junction with the White Nile. It has sprung up since 1830, and is the capital of and largest town in the Egyptian Sudan, and the emporium of a large trade, ivory, gums, ostrich feathers, senna, etc., being exchanged for European goods, and slaves being also dealt in. The city was reduced to ruin by the Dervishes in 1898, but was restored. The governor-general of the Egyptian Sudan is stationed in this city.

Khedive (ke-dēv'), a word signifying *lord,* the title of the rulers of Egypt, originally granted by a firman from the sultan in 1866 to Ismail Pasha, then *vali* or viceroy of Egypt.

Kherson (*her'* son) (or Cherson), a maritime government of Southern Russia; area 27,523 sq. mi.; pop. 1,720,249. Agriculture is in a defective state, but considerable attention is paid to the cultivation of vegetables and fruit. The bulk of the trade is carried on by its port of Odessa. KHERSON, the capital, an extensive town on the right bank of the Dnieper, about 15 mi. above its estuary. Its trade is rapidly declining, being absorbed by Odessa, and Nicolaieff, with its growing dockyards, 40 mi. distant. Tallow melting, rope making, and wool washing are still extensively carried on. Kherson is the resting place of Howard, the philanthropist, and has a monument in its vicinity erected to his memory by the late Emperor Alexander. Pop. 61,824.

Khiva (*hē'*vâ) (or Chiva), semi-independent khanate of Central Asia, forming part of Turkestan. Manufactures are very unimportant. Trade is now being rapidly developed by Russian influence, especially by their Transcaspian Railway from the Caspian to Samarkand. Pop. 500,000. The capital, KHIVA, lies on an alluvial flat at the junction of two canals, 50 mi. w. of the left bank of the Amu. Pop. 20,000.

Khoi (*ho'*i), town of Persia, prov. of Azerbijan. Pop. 30,000.

Khojend (or Khojent), a town in Russian Turkestan. It was formerly of much commercial importance, but trade has declined in recent years; a considerable trade in Russian goods is still carried on. Pop. 30,000.

Khokand (or Kokand), formerly an independent khanate of Central Asia, but since 1876 forming the province of Ferghâna in Russian Turkestan. Area 29,650 sq. mi. Cattle raising is the chief source of wealth, but heavy crops of grain and fruit are also produced. The manufactures consist chiefly of silk and cotton goods. The capital, KHOKAND, manufactures silk and cotton fabrics, and is the center of a large trade, ranking next in importance and size to Tashkent and Bokhara. Pop. 60,000.

Khorasan (*ho*-rä-sän'), a province of Persia, bordering on Afghanistan; area 140,000 sq. mi.; pop. 860,000. The most valuable mineral is the turquoise from the ancient mines of Nishapur. The principal manufactures are silk and woolen stuffs, carpets, muskets, and swordblades.

Khurja (khör'*ja*), a town of India, Northwest Provinces, with a fine Jain temple and other good buildings, and a flourishing trade, especially in cotton. Pop. 27,190.

Khuzistan (*ku*-zis-tän') (or Arabistan), a province of Persia, bounded on the s. by the Persian Gulf, and on the w. by Asiatic Turkey; area 38,600 sq. mi., watered by the Karun and other streams; pop. est. at half a million. In the south there are some extremely fertile plains, producing crops of rice, cotton, tobacco, indigo, silk, and grain. The interior and north are mountainous, and flocks and herds maintain their inhabitants. Trade is chiefly carried on with Bagdad and Bussorah. Dizful and Shuster are the chief towns.

Khyber (khī'bėr), a famous pass in the northeast corner of Afghanistan, the chief gate to that country from Peshawur, by means of which India has been invaded from time to time, and the scene of severe conflicts in the Afghan wars.

Kiang-si, one of the central provinces of China; area 72,176 sq. mi.; pop. 24,534,118. The province manufactures paper, cotton, and silk goods, and is celebrated for its porcelain. Its chief port is Kew-Kiang.

Kiang-su, the richest of the central provs. of China; area 44,500 sq. mi.; pop. 20,905,171. The cities contain the finest specimens of Chinese architecture and decoration; the rice, wheat, cotton, silk, and green tea produced are of the best, and the satins, cotton cloths, ink, and paper manufactured are unsurpassed. The chief port is Nanking.

Kidd, WILLIAM, a celebrated pirate, known as Captain Kidd, b. about the middle of the seventeenth century, and originally a shipmaster of New York. In 1696 he was appointed captain of the ship *Adventure Galley* of thirty guns by William III, for the suppression of piracy. In America he collected some 150 recruits, sailed for the East Indies; took to pirating in the Indian Ocean, and returned with his booty to New York in 1698. He was arrested and arraigned in England for piracy; but the charge could not be brought home to him; he was then tried for the murder of one of his crew, sentenced, and hanged. The myth that he buried immense treasure on the shores of Long Island Sound, or the banks of the Hudson River, gave rise to one of Edgar Allan Poe's tales.

Kidderminster, a market town of England, county Worcester, famed for the manufacture of carpets, rugs, and tapestry, which forms the staple industry of the place. Pop. 26,905.

Kidnapping, the act of getting forcible and illegal possession of the person, an offense of varied degree, but always punishable by fine or imprisonment. In its more modern and limited sense, it is applied to the obtaining of slaves or native labor by force, as practised by the Arabs in Africa. This barbarous traffic existed in very recent years in the South Seas.

Kidneys, two of the abdominal viscera, in the form of two glands, the function of which is to secrete the urine from the blood. They are situated one on each side of the vertebral column at the back part of the abdominal cavity on a level with the last dorsal and two upper lumbar vertebræ. The right kidney lies at a slightly lower level than the left. They are of the well-known "kidney bean" shape. The concave side of each kidney is turned inward and toward the spine. See *Anatomy.*

Kiel (kēl), a town of Prussia, in Sleswick-Holstein. Besides shipbuilding, it has iron foundries, engineering works, oil mills, tan works, tobacco works, etc. A great ship canal now connects the town with the Elbe. Pop. 51,706.

Kieserite (kē'zėr-īt), a sulphate of magnesia obtained at Stassfurt and elsewhere, and employed as a source of Epsom salt, and in the manufacture of manures. Mixed with quicklime and water it hardens into a mass which, after heating, pulverizing, and again mixing with water, becomes of a marble-like consistency, and may be made into ornamental articles, etc.

Kiev (or Kieff) (ki-ev', ki-ef'), a government of southwest Russia; area 19,691 sq. mi.; pop. 2,492,112. The manufacture of beet sugar has made rapid strides in recent years, and the province is now the largest producer of that article in the empire. KIEFF, the capital, is picturesquely situated on the right bank of the Dnieper. Kieff really consists of three towns, all more or less strongly fortified. Its university is one of the most important of the empire. The connection by rail with Odessa and Kursk has done much to stimulate the trade of the town. Pop. 1891, 183,640.

Kilauea, an active volcano in Hawaii, one of the Sandwich Islands. It has an oval crater, 9 mi. in circumference with a lake of red and boiling lava at the bottom, over 100 ft. below the crater's mouth.

Kildare', an inland county of Ireland, in the province of Leinster; length 40 mi.; breadth, 27 mi.; area 418,496 acres. The surface is flat, or gently undulating, the soil mostly a rich loam. Oats, potatoes, barley, and turnips are the principal crops. The manufacture of woolens is carried on to some extent, but the chief occupations are agricultural. Principal rivers—Barrow, Liffey, and Boyne. Chief towns—Naas (the county town), Athy, and Newbridge. Kildare returns two members to Parliament. Pop. 69,998. The town of Kildare stands on an eminence 30 mi. s.w. from Dublin. Near it is the common known as the "Curragh of Kildare," 4,858 acres, the property of the crown, on which a permanent military camp has been formed. Pop. 1,174.

Kil'ima-njaro (the Great Mountain), a double peaked, snowclad mountain of Africa, in the territory of the German East African Company, about 100 mi. inland from the port of Monbasa, on the Suaheli coast. The highest peak, estimated at 18,881 ft., is the highest known in the African continent.

Kilken'ny, a city of Ireland, locally in Kilkenny co., of which it is the capital, 73 mi. s. w. from Dublin. The manufacture of coarse woolens, brewing, and the working of Kilkenny black and foreign marbles into chimney-pieces, monuments, etc., form the chief industries of the town. Pop. 11,024. The county, which is in the province of Leinster, has an area of 796 sq. mi. The chief crops are wheat, oats, barley, potatoes, and turnips. Beds of fine black marble are quarried near the town of Kilkenny, and anthracite coal is raised chiefly for local consumption. Pop. 87,154.

Killar'ney, a market town of Ireland, in the county of Kerry, in the midst of beautiful scenery, within a mile of the celebrated lakes to which it gives its name. These lakes, three in number, are interspersed with wooded islands, and the lofty banks are also richly wooded. In summer Killarney is thronged with visitors. Pop. 6,651.

Killdeer, a variety of plover, common in America, and so called from its plaintive cry.

Kilmar'nock, a burgh of Scotland, in the county of Ayr, 19 mi. s.w. from Glasgow. It has long been famed for the excellence of its woolen manufactures, especially carpets, but machinery, hats, hosiery, leather, boots, etc., are also produced in increasing quantities. Pop. 27,959.

Kiln, a structure of brick or stone used for drying, baking, burning, annealing, and calcining various substances and articles, such as corn, hops, malt, cement, limestone, iron ore, glass, bricks, pottery, etc. The construction of kilns naturally varies with the special object for which they are designed, but the same principle is involved in all, that is, the generation of ample and regular heat with the least expenditure of fuel.

Kilogramme, a French weight containing 1,000 grammes=2.2 lbs. Similarly *kilomètre,* =1,000 mètres, or 0.621 mile.

Kilogrammètre, a unit employed in the measurement of mechanical work; it is the mechanical work expended in raising a body whose weight is 1 kilogramme (2.2046 lbs.) through the vertical height of 1 metre (3.2809 ft.), and is equal to 7.233 foot-pounds.

Kilpatrick, Hugh J. (1836–1881), b. in New Jersey. He graduated from West Point in 1861, and took an active part in the Civil War, being appointed major general in 1865. He was minister to Chile in 1868 and again in 1881.

Kim'berley, the capital of Griqualand West, Cape Colony, and the center of the South African diamond fields. It is connected by rail with Port Elizabeth and Cape Town, and its commerce is rapidly increasing. There are four chief mines here—Kimberley, Dutoitspan, De Beer's, and Bultfontein. Pop. 25,000.

Kimberley, a northern district of Western Australia, brought into notice by the discovery of gold fields in 1886. It contains immense tracts of splendid pasture, and much land suitable for the cultivation of wheat, sugar, tobacco, etc. The chief port for the district is Derby, on the Fitzroy River.

Kin'dergarten, a German word signifying "children's garden;" and the name given to a system of infant education introduced by Friedrich Froebel, who was largely assisted in its propagation by the Baroness Marenholz-Bülow. The system is intended to bring out the moral and intellectual capabilities of very young children chiefly by observation; pictures, toys, tools, etc., suitable for the purpose, being introduced, so as to convert schooling into play, which, according to Froebel, is the child's most serious business. The first kindergarten was opened in 1840 at Blankenburg (Prussia), and like most other innovations met at first with little encouragement, and even with opposition, but it gradually gained a footing in the best educated countries, and the progress in recent years has been great and rapid. Froebel societies for the training of teachers exist now in various countries. The system is most widely spread in the U. S. and Belgium, while Switzerland, France, and Austria are grafting it on their elementary schools.

Kinetoscope, a device for reproducing movable pictures from photographs, invented by Thomas A. Edison, in 1894. In shape it is a cabinet form, and the pictures are viewed from above through suitable lenses. The pictures come within the field of vision on a transparent film beneath which is an electric incandescent light. The result is an optical illusion, in that a series of pictures pass before the eye so rapidly that the effect is that of continuous motion. Thus, a kinetoscopic view of a boxing match shows the boxers as though the observer were really looking at the originals through the small end of an opera glass.

The original photograph is taken by means of a specially arranged camera. In this camera the shutter is a slotted disk which is revolved by mechanism so as to open and shut 42 times a second. Back of the shutter is a continuous narrow film about two inches in width. This is arranged to run from one roller to another, so that one roller is giving off the film while the other is winding it up. The roller is such that a new sensitive area is exposed at every opening of the slotted shutter. In other words, 42 fields are exposed to the light and receive the image. This film is developed and from that negative a continuous positive is printed by the usual photographic process with the modifications necessary to enable the photographer to handle the long, ribbonlike film. In the kinetoscope proper, this film passes before the object-glass at such a speed that lifelike motions are faithfully reproduced. The modifications of the kinetoscope for use in stereoptican exhibits are the cinemetograph, veriscope, and vitascope. In these devices the ribbonlike film is made to pass before a calcium or electric arc-light. A series of photographs are enlarged by means of the ordinary stereoptican lenses and thrown upon a sheet in a theater or hall, giving life-size, lifelike, continuous pictures. Such scenes as the charge of a cavalry squadron, prize fights, stage dancing, boxing, horses running, fast express trains, etc., have been reproduced by the kinetoscope.

King, Clarence (1842–1901), a noted geologist and mining engineer; b. at Newport, R. I., Jan. 6, 1842; educated at the Sheffield Scientific School, Yale. He became connected with the geological survey of California in 1863, and gave most of his time during the next five years to the exploration of the high Sierras. He made the first survey of Yosemite Valley, and discovered and named Mounts Whitney and Tindall, and also ascertained that they were the highest group in California. In 1867 he was placed in charge of the United States geological exploration of the fortieth parallel, and gave five years to this work, which resulted in a complete geological and topographical cross section of the Cordilleras. In 1879 the geological surveys acting under the government were organized under one head and placed in charge of the Department of the Interior. Mr. King was made the first director

King, William Rufus (1786–1853), statesman, was b. in Sampson co., N. C. He became a member of the state legislature in 1806, was re-elected in 1808, and in 1809 was sent to congress, serving seven years. In 1819 he removed to Alabama and became United States senator. In 1844 he was appointed minister to France, and in 1848 he again became United States senator. In 1852 he was chosen vice-president of the United States on the ticket

with Franklin Pierce, but was unable to enter upon the duties of the office on account of illness.

King Crab, a peculiar genus of crabs included in the order Xiphosura (sword-tailed), of the class Crustacea. They are found on the coasts of northern and tropical America and the Antilles, in the Eastern Archipelago and Japan. The head resembles a broad horse-shoe-shaped shield, with two pairs of eyes upon the upper surface, the second pair being the larger and forming the true visual organs. The mouth opens on the lower surface, and around it are six pairs of limbs with spinous joints attached. A second shield somewhat hexagonal in shape covers the abdominal part, and beneath it are the gills, borne upon five pairs of appendages which represent the abdominal feet of the crab. The average length of the king crab is about two feet. These crabs are destitute of swimming powers, and if placed on their backs they appear, like turtles, unable to recover their natural position. The commonest species is found chiefly on the North American coasts. The upper surface of the tail, as in other species, bears numerous spines.

Kingfisher, the name of a family of insessorial birds distinguished by the elongated, stoutly formed, tetragonal bill, broad at the base, and terminating in a finely acute point; tarsi short, feet strong, toes somewhat elongated. The common kingfisher found in Great Britain has the upper part of the head, the sides of the neck, and the coverts of the wings green, spotted with blue. The back is dark green in color, the lower back and rump being of a bright blue. The throat is white, and the under surface of the body a pale-brown color. It frequents the banks of rivers, and, perched on the bough of a tree, watches for fish. When the prey is perceived it dives into the water, secures the fish with its feet, and carries it to land, where it kills the prey and swallows it entire. It is about seven inches in length. This bird has been greatly celebrated in ancient poetic and legendary lore, and is the subject of many superstitions. The American kingfisher is of a bluish-slate color, with an iron-colored band on the breast, while the head bears a crest of feathers. The spotted kingfisher is a native of the Himalayas, where it is called the fish-tiger. A large Australian species is known as the laughing-jackass.

King of the Herrings, the popular name of the Arctic chimæra, a fish also known in certain localities by the name of "sea cat."

Kings, Books of, form two books in the English and one book in the Hebrew canon of the Old Testament. Besides their own unity the books of Kings are closely connected with first and second of Samuel, and, following these, form the third and fourth in what is known as the four books of the kingdom. From internal evidence it would seem that these were written by a series of contemporary authorities, with additions and glosses made by a ater writer. The history, as related in the books of Kings, begins with the close of David's reign, and carries the events onward to the capture of Jerusalem and the destruction of the temple. This embraces, according to the received chronology, a period of upward of 400 years (B.C. 1015–588), and includes the history of both the kingdoms of Judah and Israel. This chronology, however, is unsatisfactory, and has been much disputed. In comparing these books with the Chronicles it is found that while the former describes the divided kingdom of Israel and Judah, the latter is occupied almost exclusively with Judah; and further, that the books of Kings seem to have been compiled under prophetic, and the Chronicles under priestly influence.

King's College, London, a proprietary institution incorporated in 1829, and reincorporated in 1882. It was established for the purpose of providing education in accordance with the principles of the Church of England, and gives instruction in theology, general literature, science, engineering, and medicine; there being also a special civil service, a ladies' department, evening classes, and a school giving a preparatory education for the college classes. Students of a certain standing receive the diploma of "Associate."

Kingsley, Henry (1830–1876), an English novelist, and a brother of Charles Kingsley. Educated at King's College, London, and Worcester College, Oxford, he left England to become an Australian colonist in 1858. On his return he contributed largely to magazines and reviews. Of the novels which he published between 1859 and 1874 *Geoffrey Hamlyn* was the first, while *Ravenshoe* and *Austin Elliott* are considered the best. He was also for a short time editor of the *Edinburgh Daily Review*.

Kingsley, Rev. Charles (1819–1875), English clergyman, novelist, and poet. He was educated at King's College, London, and afterward at Magdalen College, Cambridge, where he took his degree in 1842. In 1848 he published a poem, *The Saints' Tragedy*. This was followed in 1849 by the novel *Alton Locke*, in which his opinions of the social and economic questions of the time are powerfully expressed. Upon the same lines, but dealing with the subject from the agricultural side, followed his novel of *Yeast* in 1851. In 1853 was published *Hypatia*, and in 1855 *Westward Ho*, both brilliant historical novels, the former dealing with the early Christian church, the latter with the South American adventurers of the Elizabethan era. Among his other well-known works are *Two Years Ago*, *Hereward, the Last of the Englishi*, *Glaucus*, and *The Water Babies*. He was appointed professor of modern history at Cambridge in 1859, and canon of Chester in 1869. His *Letters and Memories of His Life*, edited by his wife, was published in 1877.

Kingston, Ontario, Canada, on Navy Bay, the n.e. corner of Lake Ontario, 199 mi. s.w. Montreal. Queen's University and College, a collegiate institution belonging to the Presbyterians, a mechanics' institute, and hospital are located here. The trade is very considerable, and the harbor is accessible to ships of large size. There are mineral springs in the

town and neighborhood. Kingston was founded in 1783, on the ground formerly occupied by Fort Frontenac. It was incorporated in 1838, and returns one member to the provincial parliament. Pop. 19,264.

Kingston, the capital of the island of Jamaica. The harbor, which is 6 mi. long by 2 mi. wide, is separated from the sea by a narrow slip of low land, and forms an excellent anchorage for vessels of any size. It is defended by several forts. Pop. 46,542.

Kingston, Ulster co., N. Y., on Hudson River, 88 mi. n. of New York City. Railroads: West Shore; Wallkill Valley; and Ulster & Delaware. Industries: cigar factory, hay press, shirt, cement, railroad truck, tinfoil, and glass factories. Surrounding country agricultural and mineral. The town was first settled by the Dutch in 1652, burned by Indians in 1663, burned by British troops in 1777; became a city in 1872. Pop. 1900, 24,535.

Kingston-upon-Thames, a town of England, county of Surrey. In the neighborhood are Bushy and Richmond parks and Hampton Court Palace. Pop. 27,059.

King Vulture, the *Sarcorhampus Papa* of the intertropical regions of America. It is about 2½ ft. in length, and upward of 5 ft. across the expanded wings. The other vultures are said to stand quietly by until this, their monarch, has finished his repast.

King Wood, a Brazilian wood believed to be derived from a leguminous tree, a species of *Triptolemæa*, but by some referred to *Brya ebĕnus.* It is beautifully streaked with violet tints or West Indian ebony, and is used in turning and small cabinet work. Called also *Violet wood.*

Kink'ajou, a plantigrade carnivorous mammal of northern South America, allied to the bear family. In habits it is omnivorous, nocturnal, and docile when captured. In shape it resembles the lemur, the legs are short, fur close and woolly, tail long and prehensile. Being fond of honey they make frequent forays upon the nests of bees

Kino, an astringent extract, resembling catechu, obtained from various trees. The original is procured from a handsome East Indian tree, which yields a valuable timber. Kino is the juice of a tree dried without artificial heat. African or Gambia kino is obtained from another species, a native of tropical Western Africa. Dhak-tree or Bengal kino is the product of *Butea frondōsa;* while Botany Bay kino is got from various species of Eucalyptus. Kino consists of tannin, gum, and extractive, and is a powerful astringent.

Kio'to (or Saikio), a large city of Japan in the island of Hondo, in an extensive plain 250 mi. s. w. of Yeddo, connected by railway with its port, Osaka, and some 6 mi. from Lake Biwa. It was formerly the special residence of the Mikado, and the seat of his *dairi* or court, and hence the ecclesiastical capital of the empire. Is the center of learning, and of artistic manufactures, such as carved ivory ornaments, lacquered ware, bronze ornaments, brocaded and embroidered silks, etc. Pop. 279,972.

Kipling, Rudyard (1865——), a well-known writer; b. at Bombay, India, Dec. 30, 1865. His father was for a time director of the School of Art at Bombay, and later director of the government museum at Lahore. Kipling spent five years in the United Services College at Westward Ho, and returned to India in 1882. He then became sub-editor on the *Civil and Military Gazette,* at Lahore, which position he held until 1889. During this time many of his short stories and poems appeared in the *Gazette.* These were afterwards collected and published in book form. His first volume was *Departmental Ditties,* 1886. In 1890 he went to England via the United States. His career as an author dates from that year. In 1892 he married Miss Caroline Starr Balestier. In 1898 he travelled in South Africa, and on his return settled in England, re-visiting the U. S. in 1899. Kipling's works have attracted wide attention on account of their vivid descriptions of life in India, their keen insight into nature and character, and their elaborate word painting. *The Jungle Books, Captains Courageous, Wee Willie Winkle, The Light that Failed, Kim,* and his poems are among his best known works. Pl. 24, Vol. III.

Kirchhoff (kir*h*'hof), Gustav Robert, German physicist, b. in 1824. He was appointed professor of physics in the University of Heidelberg in 1854. He has devoted his attention to the subjects of heat, elasticity, and magnetism. Conjointly with Bunsen he discovered the spectroscope.

Kirghiz (Kirghis) (kir'gēz), a nomadic Mongol-Tartar race, numbering in its various branches about 3,000,000, and inhabiting the steppes that extend from the lower Volga and the Caspian Sea in the west to the Altai and Thian-Shan Mountains in the east, and from the Sea of Aral and the Syr Daria in the south to the Tobol and Irtish on the north.

Kish'inev (or Kishenau), a town of Russia, capital of the government of Bessarabia, on the Byk, a tributary of the Dniester. In 1812 only a small town, it is now the seat of the civil and ecclesiastical authority, has many churches, schools, theaters, and large markets for cattle and corn. Pop. about 130,000.

Kiss, the mutual touching of the lips. With some nations, as the Germans and French, men often kiss each other after a long absence, etc. Kissing the hand of the sovereign forms part of the ceremonial of all European courts. Kissing the foot is a common Oriental sign of respect, and the popes have required it as a sign of respect from the secular power since the eighth century. When this ceremony takes place, the pope wears a slipper with a cross, which is kissed.

Kissingen (kis'ing-en), a watering place of Bavaria, on the Saale, 30 mi. n. of Würzburg. The springs, five in number, and all saline, contain a large quantity of carbonic acid gas, and are used both internally and as baths. Pop. 3,873.

Kitchen Middens, the name given to certain mounds, from 3 to 10 ft. in height and 100 to 1,000 ft. in length, found in Denmark, the

north of Scotland, etc., consisting chiefly of the shells of oysters, cockles, and other edible shellfish. They are the refuse heaps of a prehistoric people unacquainted with the use of metals, all the implements found in them being of stone, bone, horn, or wood. Fragments of rude pottery occur. The bones are all those of wild animals, with the exception of those of the dog. Similar shell deposits occur on the eastern shores of the U. S. formed by the Red Indians.

Kite, a raptorial bird of the falcon family, differing from the true falcons in having a somewhat long forked tail, long wings, short legs, and weak bill and talons. This last peculiarity renders it the least formidable of the birds of prey. The common kite, glead,

Common Kite.

or glede, preys chiefly on the smaller quadrupeds, birds, young chickens, etc. It usually builds in the fork of a tree in a thick wood.

Kittiwake, a species of gull found in great abundance in all the northern parts of the world wherever the coast is high and rocky.

Kiung-chow, a seaport of Japan in the island of Formosa open to foreign trade. Pop. 40,000.

Kiu-Siu, one of the three principal islands of Japan, separated from Korea by the Strait of Korea, and from Hondo by the Strait of Sikoku. Nagasaki is situated here.

Kiwi-Kiwi. See *Apteryx.*

Klausenburg (klou'zĕn-bur*h*) (Hungarian *Kolosvár*), an Austrian town, the capital of Transylvania. It carries on an active trade, and has some manufactures, more especially porcelain. Klausenberg is the Claudiopolis of the Romans, and many Roman coins, bronzes, etc., have been found. The inhabitants are mostly Magyars. Pop. 29,923.

Klephts, properly *robbers,* the name formerly given to those Greeks who kept themselves free from the Turkish yoke in the mountains, and waged perpetual war against the Turks.

Kleptoma'nia (Greek *kleptō,* I steal), a supposed species of insanity manifesting itself in a desire to pilfer. In admitting the plea of kleptomania great caution is needed. The best way to arrive at a judgment is to consider the previous character and personal interests of the person charged; to determine the value and usefulness of the article appropriated; the methods of the appropriation and its motive.

Klondike, a tributary of the Yukon River. The Klondike placer mines are located in the beds and along the banks of the Bonanza, El Dorado, and other tributary streams and creeks of the Klondike River. This district is in the northwest territories of British America just east of the Alaskan border-line, 2,200 mi. from the mouth of the Yukon River. Gold was discovered in this district by George Carmack, a native of Illinois, in August, 1896. The gold lies all the way through a frozen bed of muck, fine and coarse gravel from 23 to 26 ft. deep. The gold is free in large grains and nuggets. The precious deposit is extremely rich and miners have panned out over $300 worth of gold per pan. The world at large learned of the rich Klondike mines in July, 1897, and before the middle of August 6,000 men were on their way to the Klondike district. The richest deposits are found on the Bonanza, El Dorado, Gold Bottom, Adams, Bear, Hunker, and Too Much Gold creeks. Dawson City N.W.T., at the junction of the Klondike and Yukon rivers is the chief trading post of that district. It is estimated that over $2,000,000 in gold was taken from the Klondike placer mines in 1897. Mining operations are seriously embarrassed by the short summer period; three months is the limit of outdoor work. Miners excavate pay-dirt during the winter months and wash the dirt during summer. By 1902 about $30,000,000 in gold had been taken out. In that year a diminution in the supply was noticeable, several of the richest claims having been exhausted and no compensating new fields discovered.

Knighthood, Orders of, the name given to organized and duly constituted bodies of knights. The orders of knighthood are of two classes — either they are associations or fraternities, possessing property and rights of their own as independent bodies, or they are merely honorary associations established by sovereigns within their respective dominions. To the former class belonged the three celebrated religious orders founded during the Crusades — Templars, Hospitallers, and Teutonic Knights. The other class, consisting of orders merely titular, embraces most of the existing European orders, such as the order of the Golden Fleece, the order of the Holy Ghost, the order of St. Michael. The British orders are the order of the Garter, the Thistle, St. Patrick, the Bath, St. Michael and St. George, the Star of India, and the order of the Indian Empire. The various orders have each their appropriate insignia, which generally include a badge or jewel, a collar, a ribbon of a certain color, and a star.

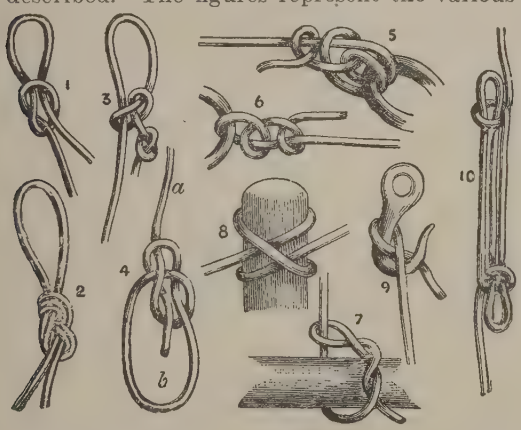
Knight Service, the original and most honorable species of feudal land tenure. The holder of a knight's fee, the extent of which is now doubtful, was bound to render military service to his lord for forty days in every year

if required. The holder of half a knight's fee attended twenty days, and the holder of smaller fractions in proportion. Knight service was abolished Charles II cap. XXIV, freehold taking its place.

Knights of Labor, a labor organization founded at Philadelphia in 1869. Its operations are secret, but its professed object is the amelioration and protection of the laboring classes. This body comprehends the intelligences of the wage workers of the U. S. Of late years the membership has largely decreased, through internal dissensions and ill-advised strikes.

Knitting, an industrial and ornamental art allied to weaving, but of much later origin. It consists in forming a series of loops with a single thread, through which another row of loops is passed, and so on consecutively; differing from crochet in so far as the series of loops are not thrown off and finished successively. In hand-knitting steel wires are used to form the loops on. For manufacturing purposes hand-knitting has been entirely superseded by machinery.

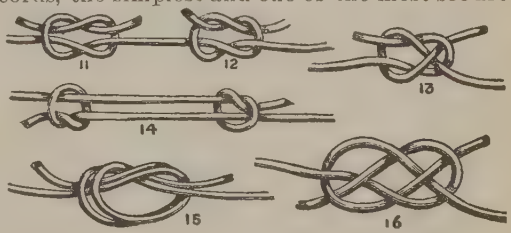
Knots include the various methods of tying, fastening, and joining ropes or cords. From 150 to 200 different kinds of knots may be enumerated, mostly used on shipboard, though almost all occupations using ropes or cordage have special kinds of knots adapted to their different requirements. While the great majority of these are purely technical, there are a few so generally useful in the every-day occurrences of life that they may be shortly described. The figures represent the various



knots before they are drawn taut, the better to show the method of tying. Generally, the requirements of a useful knot may be stated to be that it should neither "slip" nor "jam" — i. e., that, while it holds without danger of slipping while the strain is on it, when slackened it should be easily untied again. The simplest knot is the common one tied on the end of a thread or cord to prevent it slipping. By passing a loop instead of the end of the cord the common slip knot (fig. 1) is formed; and a useful fixed loop is got by tying a simple knot, or the "figure of 8 knot" (2), on the loop of a cord. One of the simplest and most useful running knots for a small cord is made by means of two simple knots (3). The most secure method of fastening a line to, say, a bucket is the standing bowline (4); and a running bowline is formed by passing the end *a* through the loop *b*, thus making a running loop. Another good knot to make fast a bucket is the anchor-bend (5). Out of the score or so of methods of fastening a boat's painter the one which will be found most useful is the well-known two half-hitches (6). The timber-hitch (7) is useful for attaching a line to a spar or a stone, and the clove-hitch (8) is invaluable for many purposes. It is very simple and cannot slip.

A simple method of fastening a rope to a hook is the blackwall-hitch (9), where the strain on the main rope jams the end so tightly against the hook that it cannot slip. There are many methods for shortening a rope temporarily, one of them being the sheep-shank, the simplest form of which is shown in fig. 10.

Of the methods for uniting the ends of two cords, the simplest and one of the most secure



is the common reef knot (11), which must be carefully distinguished from the "granny" (12), which will jam if it does not slip; the reef knot will do neither. For very small cords or thread the best knot is the weavers' (13). The fisherman's knot is a very useful one for anglers, and is formed by a simple knot in each cord being slipped over the other (14); when drawn taut it is very secure, and it is easily separated by pulling the short ends. A useful method of uniting large ropes is shown in fig. 15: tie a simple knot on the end of one rope, and interlace the end of the other and draw taut. This tie may also be made with the figure of 8 knot. For very large ropes the carrick bend (16) is the simplest and most secure. The bowline bend is formed by looping two bowline knots into each other. See *Splicing.*

Knot, a grallatorial bird, closely allied to the snipe.

Knotgrass, a very common weed, remarkable for its wide distribution. It is of low growth, with branched, trailing stems, and knotted joints (whence the name).

Knout, a kind of whip or scourge serving as an instrument of punishment in Russia. It was formerly in use in the army, but a few strokes only are now inflicted, as a disgrace, in case of dismissal. It is still sometimes used for criminals. The nobles were exempted from the knout, but the exemption was not always observed.

Knowles (nōlz), James Sheridan (1784–1862), dramatist. He took to the stage in 1798, but

meeting with indifferent success, he devoted himself to teaching, first in Belfast, and afterward in Glasgow. His tragedy of *Caius Gracchus* was performed in 1815 with success, and from this time he had a prosperous career as author, actor, and lecturer. About 1845 he retired from the stage He became afterward a Baptist preacher, and published several theological works.

Know Nothings, the popular name for the Native American party, which was formed in the U. S. shortly before 1855, gained considerable successes in that year, lost its ground hopelessly in 1856, and soon after disappeared from American politics. Its distinctive principle was that the government of America must be in the hands of Americans; naturalization was to follow only after twenty-one years' probation, and allegiance to any foreign potentate or power was to be a bar to selection for political office. The order was a secret one.

Knox, Gen. Henry (1750–1806), American revolutionary soldier, b. in Massachusetts. At an early age he began a military career, and took an active part in the contests immediately preceding the Revolutionary War. In 1776 he became a member of Washington's staff. He took part in the battles of Bunker Hill, Brandywine, Germantown, Trenton, and Monmouth; he was also at Yorktown. Washington made him secretary of war. Later he was elected to the Maine legislature.

Knox, John (1505–1572), the chief promoter of the Reformation in Scotland, was b. at Gifford, in East Lothian. He was educated at either Glasgow or St. Andrews. He became an avowed advocate of the reformed faith about 1542. In 1546–47 be preached to the beleaguered Protestants in the castle of St. Andrews, and when it was taken by the French, Knox was sent to France with the other prisoners, and put to the galleys, from which he was released in 1549. In 1551 he was appointed chaplain to Edward VI, and preached before the king at Westminster, who recommended Cranmer to give him the living of Allhallows, in London, which Knox declined, not choosing to conform to the English liturgy. It is said that he also refused a bishopric. On the accession of Mary, in 1554, he quitted England, and sought refuge at Geneva, where he had not long resided before he was invited by the English congregation of refugees at Frankfort-on-the-Main, to become their minister. A dispute concerning the use of a church service sent him back to Geneva, whence after a residence of a few months, he ventured, in 1555, to pay a short visit to his native country. He again retired to Geneva, where he wrote several controversial and other works, including the *First Blast of the Trumpet against the Monstrous Regiment of Women,* chiefly aimed at the cruel government of Queen Mary of England, and at the attempt of the queen regent of Scotland to rule without a Parliament. A *Second Blast* was to have followed; but the accession of Queen Elizabeth to the throne of England, who was expected to be friendly to the Protestant cause, prevented it. In May, 1559, he returned to Scotland, and immediately joined the Lords of the Congregation. He preached at Perth on the occasion when the inflamed multitude made a general attack on the churches of the city, the altars being overturned, the pictures destroyed, the images broken, and the monasteries almost leveled to the ground. Being appointed minister of Edinburgh, he took a prominent part in the proceedings of the Protestant leaders from this time onward, and had the principal share of the work in drawing up the Confession of Faith, which was accepted in 1560 by the Parliament. In 1561 the unfortunate Mary arrived in Scotland. She immediately began the regular celebration of mass in the royal chapel, which, being much frequented, excited the zeal of Knox, who openly declared from the pulpit, "that one mass was more frightful to him than 10,000 armed enemies landed in any part of the realm." This freedom gave great offense, and the queen had long and angry conferences with him on that and other occasions. In 1569, Knox retired for a time to St. Andrews. In 1572 he was greatly offended with a convention of ministers at Leith, for permitting the titles of archbishop and bishop to remain during the king's minority. At this time his constitution was quite broken, and he received an additional shock by the news of the massacre of St. Bartholomew. He had, however, strength enough to preach against it, but soon after took to his bed, and died. He was twice married, first to Marjory Bowes in 1555, and secondly, in 1564, to Margaret Stewart, daughter of Lord Ochiltree. In addition to numerous polemical tracts, letters, and sermons, Knox wrote a *Historie of the Reformation of Religion within the Realm of Scotland.* The best edition of his works is that edited by David Laing (1846–64); the standard biography is M' Crie's *Life of Knox.*

Knox, Philander C., attorney-general of the United States; b. in Pittsburg, Pa., in 1852; graduated from Mt. Union College, Alliance, Ohio, 1872. He was admitted to the bar in 1875, and with the exception of the year in which he was assistant United States district attorney, was engaged in active practice in his native city until 1901, when he was appointed attorney-general by President McKinley. Knox has been much engaged as a corporation lawyer and is considered one of the best authorities on corporation laws.

Knoxville, county seat of Knox co., Tenn., 111 m. n. e. of Chattanooga; at the head of navigation on the Holston river, and on the Southern, the Atlanta, Knoxv. & Northern, the Knoxv. & Augusta and the Knoxv., Cumberland Gap & Louisv. railroads. The city is picturesquely situated among the foothills of the Clinch Mountains. It lies in a rich coal, iron and marble region and in commercial importance is one of the chief inland cities of the South. It has a large wholesale trade in marble and in agricultural produce. Its manufactures are also important, including flour, lumber, furniture, cotton and woolen goods. wagons and foundry products. Knox-

ville is the seat of the University of Tennessee, of Knoxville College (colored), of the Agricultural College and of state asylums for the insane and for the deaf and dumb. It has also a fine government building, Lawson McGhee Memorial Library, the old Capitol building, a courthouse, city hall, city market, and city hospital. Other features of interest are the iron bridge across the river, Gray cemetery and the National Cemetery. Knoxville was laid out and named after Gen. Henry Knox in 1791. From 1792 to 1796, it was the capital of the "Territory South of the Ohio" and of the state from 1796 to 1811. During the Civil War the Confederates held it until Aug. 1863, when Gen. Burnside took it. A Confederate force besieged it, unsuccessfully, from Nov. 10–30. Pop. 1900, 32,637.

Koala (ko-ä'la), or *Native Bear*, an Australian marsupial. It somewhat resembles a small bear, hence its scientific name, *Phascolarctos cinereus*. There is hardly any rudiment of a tail. Its forefeet have five toes, two of which are opposed to the other three. The koala lives much on trees, feeding on the leaves, and often burrowing for roots.

Kobe, a seaport of Japan, adjoining Hiogo so closely as to form one town with it. It is of more recent origin than Hiogo, and is strictly the port opened by treaty to foreign commerce. Combined pop. 102,841.

Kokomo, county seat Howard co., Ind., on the Wildcat river, 54 m. n. of Indianapolis. Railroads: L. E. & W.; P., C., C. & St. L., and St. L. & K. C. It is in an agricultural, stock raising, lumbering and natural gas region. It manufactures machinery, furniture, woolen goods, flour, plate-glass and automobiles. Kokomo has good schools, with a high school building costing $40,000. Pop. 1900, 10,609.

Koch, Dr. Robert (1843———), a noted German physician and bacteriologist; b. at Clausthal, Hanover, Dec. 11, 1843. In 1866 he became assistant in the general hospital at Hamburg, Dr. Koch has become noted for his investigation of bacteria as a source of disease, and has been able to place bacteriology on a firm foundation as a science. In 1882 he discovered the germ, *bacillus tuberculosis*, which produces consumption, and the next year was sent by his government to Egypt to investigate the cause of cholera. He discovered the *comma bacillus* which causes this disease. In 1890 he proposed the lymph treatment for consumption; but the treatment has not been successful. Dr. Koch is a member of the medical faculty of the University of Berlin. Pl. 17, Vol. II.

Kola (Cola), a genus of plants native of Western Tropical Africa. The *Kola* or *Sterculia acuminata* produces a fruit which consists of two, sometimes more, separate pods containing several seeds about the size of horse-chestnuts. The seeds have been found to contain caffeine, the active principle of coffee, as also the same active principle as cocoa with less fatty matter. A drink prepared from them is largely used in tropical Africa, and is said to have digestive, refreshing, and invigorating properties. The tree has been introduced into the West Indies and Brazil. The negroes of Jamaica are said to get quickly rid of the effects of intoxication by using the kola nut. It has been introduced into Britain, manufactured into a paste, or into tablets, and used as a tonic.

Kolome'a, a town of Austria in Galicia, 108 mi. s.s.e. Lemberg, on the right bank of the Pruth. Industries: Petroleum refining and manufacture of fine pottery. Pop. 23,109.

Königsberg (*keu'* nĭ*h*s-ber*h*), a fortified seaport town of Prussia, capital of the province of East Prussia. The university, founded in 1544 by the Margrave Albert, is attended by 800 to 900 students, and has connected with it a library of 220,000 vols., a zoological museum, and other valuable collections. The manufactures of Königsberg are various. The chief trade is in grain, flax and hemp, timber, tea, etc. Pop. 161,528.

Königshütte (*keu'* nĭ*h*s-hŭt-ĕ), a town of Prussia, province of Silesia, 49 mi. e. s. e. of Oppeln. The inhabitants are chiefly employed in iron working and mining, coal and iron being raised in large quantities, and also zinc. Pop. 32,072.

Koodoo (native name), the striped antelope, a native of South Africa, the male of which is distinguished by its fine horns, which are nearly 4 ft. long, and beautifully twisted in a wide spiral. The koodoo is of a grayish brown color, with a narrow white stripe along the back, and eight or ten similar stripes proceeding from it down either side. It is about 4 ft. in height, and fully 8 in length.

Ko'ran (*Al-Korân* that is *the Koran*, which means originally "the reading, or that which is to be read,"), the book containing the religious and moral code of the Mohammedans, and by which, indeed, all their transactions, civil, legal, military, etc., are regulated. According to the Mohammedan belief it was written from the beginning in golden rays on a gigantic tablet in the highest heavens, and portions were communicated by the angel Gabriel to Mohammed at intervals during twenty-three years. These were dictated by Mohammed to a scribe and kept for the use of his followers. After Mohammed's death, they were collected into a volume at the command of Mohammed's father-in-law and successor Abu Bekr. This form of the Koran, however, was considered to contain erroneous readings, and in order to remove these Caliph Othman caused a new copy to be made from the original fragments in the thirtieth year of the Hejira (652 A.D.), and then ordered all the old copies to be destroyed. The leading doctrine of the Koran is the Oneness of God, clearly laid down in the symbol of the Moslem—"God is God, and Mohammed is his prophet." To Christ it assigns a place in the seventh or highest heaven, in the immediate presence of God, but he is simply regarded as one of the prophets—Adam, Noah, Abraham, Moses, Jesus, and Mohammed. The doctrines of good and bad angels, and of the resurrection and final judgment, are fully set forth, as is also God's mercy,

which secures entrance into heaven and not the merits or good works of a man. The joys of heaven range from music and women to the supreme joy of beholding God's face, while the pains of hell are depicted in vivid colors. Idolatry and the deification of created beings are severely condemned. Another dogma is set forth in the Koran, yet not explicitly, that of the unchangeable decrees of God. Mohammed used the doctrine of predestination with great success to infuse into his adherents undaunted courage, which elevated them above all perils. The Koran prescribes prayer, fasting, alms, and the pilgrimage to Mecca and Mount Ararat. The great fast is that of Ramadan. He prescribed prayer five times a day with the face turned toward Mecca. Purification must precede prayer, and where water is unattainable dry dust or sand may be used. To give alms was always a particular trait of the Arabians, but Mohammed made it obligatory. The pilgrimage or something similar had existed with most sects before him. In respect to the civil laws relating to polygamy, divorce, inheritance, etc., Mohammed followed step for step the laws of Moses and the decisions of the rabbis, only adapting them to the customs and prejudices of his countrymen. The Koran is written in prose, but the different parts of a sentence end in rhymes. In size it is about equal to the New Testament; it is divided into 114 *surahs* or chapters of unequal length, each of which begins with the phrase, "In the name of God." As the work was written at different times, in different moods, and on different occasions, there is naturally great diversity in the style of different passages. The language is considered the purest Arabic.

Kordofan', a country of Africa, in the Eastern Soudan between Darfur and the Nile. From 1821 to 1883 it formed one of the Soudanese provinces of Egypt, but at the latter date it was freed from Egyptian rule through the Mahdi's insurrection, and has since been virtually independent. The surface is generally flat and the soil naturally fertile. The climate in the wet season, lasting from June to October, is extremely unhealthy; in the dry season, though healthy, it is intolerably hot. The principal articles of trade are gum, hides, senna, ivory, cattle, gold, salt, slaves, etc. Cultivation is almost wholly confined to duchn, a species of millet. The inhabitants consist of negroes, Arabs, etc. Pop. est. at 400,000. The chief town is El Obeld.

Korea, a kingdom of Asia, consisting chiefly of a peninsula lying n.e. of China. It is called by the natives Tsiotsien, and by the Japanese Korai, whence its European name. Pop. 17,000,000; area 81,901 sq. mi. Söul or Seoul is the capital. The peninsula is traversed through its length by a mountain range, abrupt and precipitous on the east, but forming a gentle slope on the west side, which, being watered by the principal rivers of the country, is exceedingly fertile. In the north the only grain that can be grown is barley; but in the south, wheat, cotton, rice, millet, and hemp are grown extensively. The ginseng root is a production greatly valued in China and Japan. The domestic animals are oxen, pigs, goats, dogs, and cats, and a small race of horses. Oxen only are used for agricultural labors, the horse being reserved expressly for the saddle. Tigers, panthers, foxes, wolves, and sables are abundant. The manufactures are, generally speaking, rude, and mostly confined to tissues of hemp and cotton, silk, paper, and pottery. The peninsula abounds in minerals, gold, silver, iron, copper, lead, and coal, and the natives show much artistic skill in the art of working metals. Korea is governed by a king, whose sway is in a manner absolute. Buddhism, Confucianism, and Taoism are the chief religions. The Korean language is quite distinct from Chinese; but all the educated classes use the Chinese system of writing. The Koreans resemble the Japanese more than the Chinese. The exports are chiefly beans, ginseng, hides, and gold; the imports chiefly cotton goods. The telegraph, electric light, etc., are being now introduced. Korea was the cause of the "Yellow War." Internal disturbances occurred in 1894, and the Chinese faction appealed to China for aid and the Japanese faction to Japan. (For full account of the "Yellow War" see *China*, sub-head *History*.) By the treaty of peace in May, 1895, China renounced her claim, and under Japanese influence, with the aid of money borrowed from Japan, many constitutional changes have been introduced. Since the close of the war several concessions have been sought by European nations, though there has been no demand for territory on account of the fact that Korea was declared absolutely independent in the treaty between China and Japan, and between Russia and Japan.

Körner (keur'nĕr), Karl Theodor (1791–1813), German poet. He wrote the tragedies of *Rosamunde* and *Zriny*, and a large number of dramas for the Theater Royal at Vienna, but owes his fame to his celebrated patriotic lyrics, which are all national in Germany. In 1813, when Germany took up arms against Napoleon, Körner joined the famous Lützow corps of black hussars, and was fatally wounded in a skirmish fought in the neighborhood of Gadebusch, in Mecklenburg-Schwerin.

Kosciusko (kos-si-us'ko or kosh-tsyush-kō), Thaddeus (1746–1817), Polish patriot, was b. in Lithuania of an ancient and noble family. He was educated in the military school at Warsaw, and was afterward sent at the expense of the state in the capacity of sub-lieutenant to complete his studies in France. On his return to Poland he became tutor to the daughter of Gosnovski, marshal of Lithuania, but having conceived a passion for his pupil, and being disappointed in his suit, he quitted his native country and betook himself to America (1776), where he attracted the notice of Washington, was appointed by him engineer, with the rank of colonel, and afterward general of brigade. He did not return to Europe till three years after the conclusion of the Peace of 1783. For some years after

his return he lived in retirement, but after serving in his own country under Poniatovski, he was appointed in 1794 generalissimo of the insurgent forces, he defeated the Russians at Raclavice, near Cracow, but at the battle of Maciejovice his army was defeated and he himself wounded and taken prisoner. He remained in captivity for two years, but was liberated on the accession of Paul I, of Russia, in 1796. After visiting England and America, he ultimately settled at Soleure in Switzerland, where he continued to live in quiet retirement. In 1817 he issued from here a letter of emancipation to the serfs on his estate in Poland. In 1818 his body was removed at the expense of the Emperor Alexander of Russia to Cracow, where it was buried in the cathedral, and where a monument was erected to him. A mound 150 ft. in height, formed of earth from all the principal battlefields of Poland, was also raised to his memory in the vicinity of Cracow.

Kosciusko, Mount, one of the highest mountain peaks in Australia, in the Muniong Alps, in New South Wales, near the frontier of Victoria; 7,308 ft. high.

Koslov (or Kosloff), a town in Russia, in the government of Tambov, and 52 mi. w.s.w. of the town of Tambov. It has a considerable trade in cattle, several important annual fairs, and manufactories of woolens, linens, etc. Pop. 25,522.

Kossuth (kosh'shut), Lajos (Louis) (1806–1894), Hungarian patriot, b. at Monok in the county of Zemplin, Hungary. He studied law, and in 1832 entered the Pressburg parliament. In 1841 he became editor of the *Pesth Journal,* and in 1844 he founded a national league in opposition to the Viennese government. During the Hungarian war for liberty he was chosen governor or dictator, but the intervention of Russia rendered all the efforts of the Hungarians unavailing. Kossuth resigned, was succeeded by Görgey whom he accused of treachery, and was interned in Turkey. He was released through the intervention of Britain and the U. S.; visited these countries and met with an enthusiastic reception. He was long regarded as the leader of the Irreconcilable party, but in 1884 he became reconciled to the Hapsburg rule.

Kostroma', an inland government of Russia, area 30,811 sq. mi. Hemp and flax are largely grown, and the industries include the manufacture of silver and copper wares, leather, chemicals, etc. The forests are extensive. Pop. 1,290,399. Kostroma, the capital, stands 56 mi. e. of Jaroslav. It is an ancient place, and has a fine old cathedral situated in the Kreml or former citadel. Pop. 28,143.

Kotah, an Indian native state in Rajputána, under the political superintendence of a British agent. Area 3,797 sq. mi., pop. 517,275. Kotah, the chief town, is situated on the river Chambal, and has a pop. of 40,270.

Kottbus, a town in Prussia, province of Brandenburg and government of Frankfurt, on the Spree, 65 mi. s.e. of Berlin. It is a busy manufacturing town. The chief manufactures are woolen cloth and yarns, linen, hosiery, tobaccos, toys, and carpets. There are also distilleries and breweries. Pop. 28,249.

Koumiss (or Kumiss), a preparation of milk, whether cow's, mare's, ass's, goat's, which is said to possess wonderful nutritive and assimilable properties. It consists essentially of milk in which alcoholic fermentation has been developed. On the Asiatic steppes, where it has been long used as a beverage, it is made of mare's milk; but koumiss of mare's milk or goat's milk has a somewhat unpleasant smell.

Kovno, a town in Russian Poland, in the government of the same name, of which it is the capital, 52 mi. w.n.w. Vilna, on the left bank of the Niemen or Memel. The population, a great part of which consists of Jews, is 49,896. The government has an area of 15,602 sq. mi., and its pop. is 61,461.

Kraal, a South African native village or town, usually a collection of huts surrounded by a palisade. Sometimes the term is applied to a single hut.

Krakato'a, a small uninhabited volcanic island situated in the Sunda Straits, about equally distant from Java and Sumatra.

Kraken, the term, of Norwegian origin, applied to a fabulous sea monster, generally assumed to be a gigantic Cephalopod or cuttle-fish. It was first described by Pontopiddan, bishop of Bergen in Norway, but other old writers have accounts of substantially the same kind of monster. It is described as of enormous size; rising from the sea like an island about 1½ mi. in circumference, with enormous mast-like arms with which it wrecked ships, created whirlpools, and realized all that was prodigious and strange in size, habits, and appearance. The kraken stories are much akin to the modern accounts of the great sea-serpent. Naturalists are chary of accepting any but trustworthy evidence, yet recent researches and discoveries would seem to indicate that very large members of the cuttle-fish group do certainly exist, and that, from analogy, largely developed forms of other marine classes may occasionally be found.

Krayo'va, town in Roumania, near the Schyl, capital of the administrative district of Dolshi. It has an active trade, particularly in salt from mines in the vicinity. Pop. 40,000.

Krefeld (krā'felt), a town in Rhenish Prussia, in the government of Düsseldorf, and 12 mi. n.w. of the town of Düsseldorf. It is the principal locality in Prussia for the manufacture of silks, velvets, and mixed silk goods. There are also manufactories of woolen, linen, and cotton cloth, wax cloth, hosiery, soap, candles, paper, leather, chemical products, and tobacco. Pop. 90,236.

Krementchug, a town in Russia, government of Poltava, 67 mi. s.w. of the town of Poltava, on a sandy plain on the left bank of the Dnieper, here crossed by a magnificent tubular railway bridge. It has a considerable trade in salt, tallow, and timber. Pop. 47,473.

Kremlin (Russian, *Kreml*), a fortress, in Russia the citadel of a town or city; specifically applied to the ancient citadel of Moscow.

Kreutzer (Kreuzer) (kroit'sĕr), an old South German copper coin, equal to the sixtieth part of the gulden or florin, or about ⅔ of a cent or about 6 mills. The Austrian current coin bearing this name is the hundredth part of a florin.

Kriegspiel (krē*h*'spēl) (War Game), a game of German origin, played with maps on a large scale, and colored metal blocks, on the same scale as the map, representing bodies of troops of various strength (brigades of infantry, battalions of rifles, regiments of cavalry, besides artillery, engineers, pontoon troops, telegraph troops, etc.). The players are usually two on each side, and the game forms an exact miniature of tactical operations. It is played by alternate moves. Each move represents the lapse of two minutes, and rules are given to determine the distance that each branch of the service may move over in that time. When two bodies of men on opposite sides come into contact, the weaker in numbers and position is held to be defeated; but when they are equal in these respects victory is determined to one side or the other by the use of a die. The game is a favorite one in the German army.

Kris (krēs) (or Krees), the dagger or poniard forming the universal weapon of the inhabitants of the Malay Archipelago. There are many forms of it, short and long, with straight or serpentine blade, and with every variety in the shape and ornamentation of the hilt and scabbard.

Krishna, in Hindu mythology, the eighth avatar of Vishnu and the most popular deity in the Hindu pantheon. He was ostensibly the son of Vasudeva and Devaki of the royal family of the Bhoja reigning at Mathura. The reigning prince at the time of his birth was Kansa, who, to prevent the fulfillment of a prophecy, sought to destroy the young child, but his parents, assisted by divine power, succeeded in baffling all his efforts. Every year of his life furnishes the subject of some legend, his story showing a remarkable resemblance to those of the Greek Heracles and Apollo. After a series of amorous and heroic exploits, detailed at length in the *Puranas*, he slew Kansa, mounted the throne, and was at last killed by the arrow of a hunter, shooting unawares in a thicket.

Krish'nagar, a town of Hindustan, administrative headquarters of Nadiya district, Bengal, on the left bank of the Jalangi River. It has a college affiliated to the Calcutta University, a collegiate school, a considerable trade, and manufactures of colored clay figures. Pop. 27,477.

Kropot'kine, Prince Peter Alexeievitch (1842–), Russian anarchist, b. at Moscow. In 1871 he joined the International Society, and began working his revolutionary ideas in Russia. He was condemned to three years' imprisonment, but made his escape and took up residence in Switzerland. Expelled from Switzerland he took refuge in France, and was, in 1883, condemned to five years' imprisonment for complicity in outrages at Lyons, but was pardoned in 1886, when he went to England.

Kruger, S. J. Paul (1825–1904) an African statesman; b. at Rastenburg in 1825. He passed the first forty-seven years of his life as a private citizen. In 1872 he became a member of the Executive Council of the South African Republic, and in 1882 was elected president, being successively re-elected in 1888 and 1894. President Kruger used all his powers and influence against British aggression, and in 1884 succeeded in obtaining a considerable reduction in the suzerain powers claimed by Great Britain. He was also successful in defeating the Jameson raid in 1896 (which see). He believed that war with Great Britain was inevitable and saw that his country was thoroughly equipped with arms and ammunition before the struggle began. When the British approached Pretoria in 1900, Kruger moved his capital eastward and in September crossed into the Portuguese possessions, whence he sailed for Europe in October. He made several attempts to secure the assistance of the European powers in putting an end to the war, but without avail, and finally took up his residence at The Hague. Shortly before his death, he published his autobiography.

Krupp (krup), Alfred (1812–1887), German engineer and iron manufacturer. He succeeded his father as proprietor of a small metal foundry at Essen, which he gradually developed to an enormous extent. He discovered a new method of casting steel in large masses, which he exhibited in 1851. This led him to the manufacture of heavy steel ordnance, and especially to the construction of heavy, breech-loading guns of a type invented by himself, the first of these being produced in 1864.

Krupp, Friedrich Alfred (1854-1902), son of Alfred Krupp, known in Germany as the *Cannon King*. Upon the death of his father, he undertook the direction of the great works at Essen, and vastly improved the capacity of the business. He invented a new bessemer steel, out of which he made rifles and cannons and a seamless tire for car wheels, and discovered a new method of hardening armor plate. At his death in 1902, he was the richest man in the Empire. He was also well known for his generous dealings with his operatives, having built for them comfortable modern dwellings, each with its garden, and provided a pension fund of over $4,000,000 for their benefit. The Krupp works cover over 150 acres. The business is now directed by his daughter.

Kublai (kö'blā) **Khan** (more properly Khubilai Khan) (1214–1294), Mongol emperor, founder of the twentieth Chinese dynasty, that of the Mongols of Yuen. In 1259 he succeeded his brother as Grand Khan of the Mongols, and in 1260 he conquered the whole of Northern China, driving out the Tartar or Kin dynasty. Marco Polo, who lived at the court of this prince, describes the splendor of his court and entertainments, his palaces and hunting expeditions, his revenues, his extraordinary paper currency, his elaborate system of posts, etc.

Kublai Khan is the subject of a poetical fragment by Coleridge.

Kuka (or Kukawa), a town in Western Africa, the capital of Bornou, about 20 mi. w. from Lake Chad.

Ku-Klux Klan, a secret society founded at Pulaski, Tenn., in 1866. Primarily the objects of the society were social improvement, but it soon developed into a strong secret political organization, and gained over 500,000 members. The political purpose of the Ku-Klux was to intimidate Negroes and those who were in favor of the government's reconstruction measures, and thus prevent them from voting. They operated under disguise and usually in the night. Many outrages and crimes were committed by them, and in 1871 the government took active measures to break up the organization. This soon caused them to disband. Their work was never approved by the better class of people in the South.

Kum (or Koom), a town of Persia, 78 mi. s.w. of Teheran; formerly a place of great magnificence, but destroyed by the Afghans in 1722. Pop. about 20,000.

Kumquat, a very small variety of orange tree growing not above 6 ft. high, and whose fruit, of the size of a large gooseberry, is delicious and refreshing. It is a native of China and Japan, but has been introduced into Australia.

Kurdistan (kur-di-stän′) ("Land of the Kurds"), an extensive territory of Western Asia. It is a mountainous region, containing considerable forests of oak and other hard timber, and also numerous pastures on which horned cattle, sheep, and fine-haired goats are reared, and in the valleys many fertile districts yielding rice, cotton, flax, fruits, and gall nuts. The Kurds, to whom the territory owes its name, are not confined within its limits, but are found in considerable numbers eastward in Khorasan and over the hilly region of Mesopotamia, as far west as Aleppo and the Taurus. They are a stout, dark race, well formed, with dark hair, small eyes, wide mouth, and a fierce look. On their own mountains they live as shepherds, cultivators of the soil, and bandits. Their language is a dialect of Persian, now much mixed with Arabic and Syriac; their religion Sunnite Mohammedanism. The Kurds owe but slight allegiance to either Turkey or Persia, living in tribes under their own chiefs, who commonly exact duties on the merchandise which passes over their territory. Their numbers have been estimated at 1 800 000.

Kuropatkin, Alexei Nicholaevitch (1849——), a Russian general. He won distinction in the Russo-Turkish wars, gaining promotion from lieutenant to colonel; became lieutenant-general in 1890 and minister of war in 1898. In 1904 he resigned to assume command of the Russian troops in the Japanese war. He is one of the most astute of modern commanders.

Kuro Sivo (or Japan Current), the Gulf Stream of the Pacific, is the offspring of the great equatorial current, flows past Formosa, Japan, the Kuriles, the Aleutian Islands, and thence bends southward to California. It is much inferior to the Gulf Stream, both in volume and high temperature.

Kurrachee (ka-rä′chē) (or Karachi), an important seaport of India, on the coast of Sind. The town came into British possession in 1842, and its extensive commerce, fine harbor works, and numerous flourishing institutions have all sprung up since that time. Pop. 73,560.

Kursk (kursk), a government of Southern Russia; area 18,901 sq. mi. The climate is mild and dry, and the rich soil produces abundant crops. Pop. 2,120,250. Kursk, the chief town, on the Tuskora near its junction with the Sem, forms a railway junction from Moscow, Kieff, and Kharkoff. Pop. 45,307.

Küstenland (kus′ten-lânt) ("Coast land"), an administrative division of the Austrian Empire, at the head of the Adriatic, consisting of the county of Görz and Gradiska, and the margraviate of Istria with the town of Trieste; area 3,084 sq. mi. The majority of the inhabitants are of Slavonic origin, but there is also a large proportion of Italians and a considerable number of Germans. Pop. 647,934.

Kuta′ya, (or Kuta′iah) a town in Asiatic Turkey, 180 mi. n.e. of Smyrna, on the route between Constantinople and Konia. It is the center of the tract where the famous Turkey carpets are manufactured. Pop. est. 60,000.

Kuve′ra, in Hindu mythology, the god of wealth. He resides in the splendid palace of Alaka, on Mount Meru, and is borne through the sky by four attendants on a radiant chair given to him by Brahma. He has no temples dedicated to him, and no altars. On his head is a richly ornamented crown, and two of his four hands hold closed flowers of the lotus.

Kwangsi, a province of China. Rice is largely grown, and gold, silver, and mercury are mined. Area 78,250 sq. mi.; pop. 5,151,327.

Kwangtung, the most southerly province of China, bordering on the Gulf of Tonquin and China Sea. The northern part is mountainous, but the southern region is about the most fertile in China. It includes Hainan and a number of smaller islands along the coast. The capital is Canton; other ports are Swatow and Pakhoi. Area 79,456 sq. mi.; pop. 29,706,249.

Kweichow, a province of Southwest China, bounded by Sechuen, Yunnan, Hunan, and Kwangsi. It is rough and mountainous, produces rice, tobacco, and timber, and has mines of copper, iron, lead, and mercury. Area 64,554 sq. mi.; pop. 7,669,181.

Kyanizing, a process for preserving timber, cordage, etc., from the effects of dry rot, named from the inventor, a Mr. Kyan. It consists in immersing the material to be preserved in a solution of corrosive sublimate. This process is now almost entirely disused, as wood is much better preserved by being saturated with creosote or coal tar.

Kyrie Eleison (kī′ri-ē ē-lī′son) (from the Greek *Kyrie eleēson*, "Lord, have mercy"), a kind of invocation used in parts of the Catholic Church service. It is almost the only part of the liturgy in which the Latin Church has retained the use of Greek words.

L

L, the twelfth letter of the English alphabet, is usually denominated a semi-vowel or a liquid. *L* has only one sound in English. The nearest ally of *l* is *r*, the pronunciation of which differs from that of *l* only in being accompanied by a vibration of the tip of the tongue. There is no letter, accordingly, with which *l* is more frequently interchanged, instances of the change of *l* into *r* and of *r* into *l* being both very common in various languages. In fact, in the history of the Indo-European alphabet *l* is considered to be a later modification of *r*.

Laager (lä'gėr) (D. "a camp"), in South Africa, an encampment more or less fortified. The original Boer laager is an enclosure made of the wagons of a traveling party for defense against enemies.

Laaland (lol'lân) (or Lolland), an island in Denmark; area 462 sq. mi. The surface is low and level; the soil very fertile, yielding crops of corn, beans, hops, hemp, and excellent timber. Pop. 64,420.

Lab'arum, the imperial standard adopted by Constantine the Great after his miraculous vision of the cross and conversion to Christianity, differently described and figured, but generally represented as a pole having a crossbar with the banner depending from it and bearing the Greek letters XP (that is, *Chr*), conjoined so as to form a monogram of the name of Christ.

Labédoyère (lå-bā-dwå-yār), CHARLES ANGÉLIQUE HUCHET, COMTE DE (1786–1815), French general. He entered the army in his 20th year, served with much distinction in Spain, Germany, etc., and was several times severely wounded. Napoleon raised him to the rank of general of division in 1815, and he fought with great courage at Waterloo. After the battle he hurried to Paris, and there distinguished himself by his hostility to the Bourbons. On the capitulation of Paris he followed the army behind the Loire, but returning to Paris, he was taken, tried by court martial and sentenced to death.

La'bials, letters or characters representing a sound or articulation formed or uttered chiefly by the lips, as *b*, *f*, *m*, *p*, *v*.

Labia'tæ, the mint tribe, a very important and extensive natural order of exogenous plants, with a gamopetalous corolla presenting a prominent upper and lower lip, and a four-lobed ovary, changing to four seed-like monospermous fruits. This order contains about 2,600 species, mostly herbs, undershrubs, or shrubs with opposite or whorled leaves, usually square stems, and a thrysoid or whorled inflorescence. They are spread throughout the world, and abound in all temperate latitudes. Many are valued for their fragrance, as lavender and thyme; others for their stimulating qualities, as mint and peppermint; others as aromatics, as savory, basil, and marjoram; several are used as febrifuges. Betony, ground ivy, horehound, and others possess bitter tonic qualities. Numerous species are objects of great beauty.

Lab'oratory, a building or workshop designed for investigation and experiment in chemistry, physics, etc. It may be for special research and analyses, or for quite general work. To the former class belong the laboratories which are attached to dye works, color works, chemical, and similar works. Laboratories are also attached to mining and metallurgical schools, to mints, to arsenals, etc. A general laboratory, such as might be attached to a school or university, has to include a variety of specialties, partly because the whole science and its applications have to be taken into account and exhibited, partly because students with very different aims frequent such places.

Labouchère (lab'ų-shār), HENRY (1831–), English politician and writer, was educated at Eton. He was in the diplomatic service from 1854 to 1864; became member of Parliament in the Radical interest for Windsor (1865–66), Middlesex (1867–68). and Northampton since 1880. He has gained a certain renown for his vivacious and satirical style, both in speaking and writing. He contributed *Letters of a Besieged President in Paris* to the *Daily News*—of which he was part proprietor—during the Franco-German War. In 1877 he started *Truth*, a weekly society paper.

Laboulaye (lå-bö-lā), EDOUARD RENÉ LEFEBVRE (1811–1883), French publicist. He attained a high position as a writer of historical, social, and playfully satirical works. Among his best-known writings are, *History of Landed Property in Europe; History of the U. S.; Germany, and the Slavic States; Paris in America.*

Labor, AMERICAN FEDERATION OF. This national organization, formed in 1886, by an association of most of the Trades-Union societies in the U. S., embraces about 7,000 local unions and over 700,000 members.

Labor Bureau, a department connected with the U. S. Commission of Emigration, having its headquarters at New York. It is supported by Irish and German emigration societies. Its object is mainly to act as an agency between the immigrants and the employers of labor.

Labor Day, a day set apart by the executives or legislative bodies of most of the states of the Union, at the solicitation of the labor unions and other industrial bodies, to be devoted to processions and other festivities in the interest of labor and laboring men. September 6 has been agreed upon as the day for such celebration by the following states: Alabama, Colorado, Connecticut, Delaware, District of

Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming. Pennsylvania celebrates Labor Day on September 4.

Labor, DEPARTMENT OF, an office of the U. S. government, created in 1888, to collect and report information regarding labor, wages, capital, etc. It is in charge of a Commissioner of Labor, and employs about fifty clerks and agents.

Lab'rador, a tract of land on the east coast of British North America, between Canada and the Atlantic, under the government of Newfoundland. It is partly desolate and rocky, but there are also extensive forests, and the cod fisheries on the coast are very valuable. The interior consists mostly of a table-land 2,000 or more feet high. There are a number of lakes drained partly by rivers flowing toward Hudson's Strait, partly by others (such as Grand River), reaching the Atlantic in the southeast. The wild animals include the caribou or reindeer, bears, wolves, foxes, martens, and other fur bearing animals. The climate is rigorous, there being about nine months of winter. No ordinary cereal can ripen in the climate, though barely cut green is used as fodder, and potatoes and some culinary vegetables can be grown. The population (about 4,500 in all) consists of Indians, Eskimos, and halfbreeds, with a few whites on the coast. In summer it is increased by some 30,000 persons, chiefly from Newfoundland and connected with the fisheries. The Moravians have a number of missions along the coast, the Church of England one or two. The Hudson's Bay Company has several posts. Labrador is also the name given to the whole peninsula between the Atlantic, Hudson's Strait and Hudson Bay and the St. Lawrence.

Labradorite (Labrador Feldspar), a mineral found on the coast of Labrador, and formerly called *Labrador hornblende*, though that is the designation of hyperstheme. It is a lime soda feldspar, and is distinguished by its splendent changeability of color. Blue and green are the most common colors, but occasionally these are intermingled with rich flame-colored tints. It is sawed into slabs by the lapidaries, and employed in inlaid work.

Labrador Tea, a name given to two species of the genus *Ledum*. They grow in the north of Europe, and in America north of Pennsylvania. They are species of heath, and are low shrubs with alternate, entire leaves clothed underneath with rusty wood. The fragrant crushed leaves are used by the natives of Labrador as a substitute for tea. They possess narcotic properties, render beer heady, and are used in Russia in the manufacture of leather.

Labuan', a small British colony consisting of an island on the n.w. of Borneo. Area 31 sq. mi.; pop. 6,298, mostly Malays from Borneo. It is well supplied with water, and has a good harbor at the settlement of Victoria, on its s.e. side. Coal of excellent quality is plentiful, but has been mined hitherto with indifferent success. Other products are timber, caoutchouc, gutta-percha, wax, and sago. Its chief trade is between Borneo and Singapore. This island was taken possession of by the British in 1846, and is administered by a governor and a legislative council.

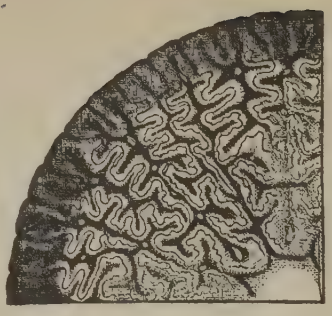
Labur'num, a tree, native of the Alps, much cultivated by way of ornament. It is well and widely known for the beauty of its pendulous racemes of yellow pea-shaped flowers. The seeds contain a poisonous substance

Laburnum.

called cytisine, and are violently emetic. The wood is much prized by cabinetmakers and turners, being wrought into a variety of articles which require strength and smoothness.

Lab'yrinth, a structure having numerous intricate winding passages, which render it difficult to find the way through it. The legendary labyrinth of Crete, out of which no one could find his way, but became the prey of the Minotaur, was said to have been constructed by Dædalus. The hint of this legend was probably given by the fact that the rocks of Crete are full of winding caves. The Egyptian labyrinth was a building situated in Central Egypt, above Lake Mœris, not far from Crocodiloplis (Arsinoe) in the district now called the Fayoum. The building, half above and half below the ground, contained 3,000 rooms. It was probably a place of burial. The labyrinth at Clusium, in Italy, was erected by the Etruscans, according to Varro, for the sepulcher of King Porsenna. There were other labyrinths at Lemnos and Samos, but their sites are unknown. Imitations of labyrinths, called mazes, were once fashionable in gardening. They were made of hedges of privet, or some similar shrub.

Labyrinth'odon, a genus of fossil amphibians, whose remains are found in the carboniferous, permian, and trias formations, those of the trias being found in England, India, and Africa. They were allied to the crocodile and to the frog, and were 10 to 12 ft. long. The name is derived from the labyrinthine structure of a section of the tooth, when seen under the microscope. The hypothetical cheirotherium has been identified with the Labyrinthodon.



Section of Tooth of a Mastodon.

Lac, or Lak, from the Sanskrit *lakshâ* or *laksha*, that is, 100,000. In the East Indies it is applied to the computation of money. Thus, a lac of rupees is 100,000.

Lac, a resinous substance produced upon numerous Indian trees by the exudations from the body of the female of the *Coccus ficus* or *Coccus lacca*. The finest is found on the palas or dhak, the peepul, and the koosum. It is composed of five different varieties of resin, with a small quantity of several other substances, particularly a red coloring matter. It is formed chiefly by the female insects, each of which inhabits a cell, the incrustation of which seems intended to serve as a protection for the young. When the covering is complete the eggs are laid and the mother dies. The young break their way out, swarm on to the bark, and immediately commence the secreting of lac. In India the cultivation of the lac insect has received much attention. *Stick-lac* is the substance in its natural state, incrusting small twigs. When broken off and washed with water it almost entirely loses its red color, and is called *seed-lac*, from its granular form. When melted and reduced to a thin crust, it is called *shell-lac*. Mixed with turpentine, coloring matters, and other substances, lac is used to make differently colored sealing-wax. Dissolved in alcohol or other menstrua, by different methods of preparation, it constitutes various kinds of varnishes and lacquers. *Lac-dye* and *lac-lake* are coloring matters used in dyeing cloth scarlet, obtained by different processes from stick-lac. In the state in which they are found in commerce they have the form of little cakes. The coloring matter of lac-dye is analogous to cochineal.

Lacaille (lá-ka-yé), Nicholas Louis de (1713–1762), French mathematician and astronomer. He was educated for the church, but soon renounced theology for astronomy. He took an important part in the work of measuring an arc of the meridian, and in 1746 he was appointed professor of mathematics in Mazarin College. In 1751 he went to the Cape of Good Hope at the expense of the government, where he determined the position of about 10,000 stars with wonderful accuracy. As his departure from the Cape was delayed he employed the interval in measuring a degree of the southern hemisphere.

Lac'cadive Isles, a group of fourteen small coral islands including three reefs in the Indian Ocean, about 150 mi. off the coast of Malabar, belonging to British India. The islands are well supplied with fish and export quantities of coir or cocoanut fiber. Cocoanuts, cowries, jaggery, plantains, poultry, etc., are the only other exports, and are of little importance. The natives are a race of Mohammedans called Moplas (of mixed Hindu and Arab descent). They are bold seamen and expert boat builders. Pop. 14,473.

Lace, a delicate kind of network, formed of silk, flax, or cotton thread, and used for the ornamenting of dresses. It is made either by hand or machine, the former being produced by the needle, or made on the pillow. Needle laces are called *point*, those made on the pillow, *cushion*, *bobbin*, or *bone* laces. A prominent feature in all laces is the pattern or ornament; this may be worked either with or without a groundwork. Pillow lace consists of hexagonal meshes, four of the sides of each mesh being formed by twisting two threads round each other, and the other two sides by the simple crossing of two threads over each other. The pattern on parchment or vellum is attached to the pillow, and pins are stuck in the lines of the pattern, round which the threads are plaited and twisted so as to form the required design. Among the laces of this class are Honiton, Buckingham, Mechlin, Valenciennes, etc. Point laces, made entirely by the needle and single thread, are known as Brussels, Alençon, Maltese, etc. Guipure lace consists of a network ground on which patterns are wrought in various stitches with silk, etc. It was originally a lace made in silk, thread, etc., on little strips of parchment or vellum. At Nottingham and elsewhere imitations of lace are produced by machines, called point net and warp net, from the names of the machines in which they are made. They are both a species of chain work, and the machines are varieties of the stocking-frame. The manufacture of lace appears to have existed from a considerably remote antiquity, as in the representations of Grecian female costume which have come down to us the dresses are frequently ornamented with lace of beautiful patterns. In modern times point lace originated in Italy, from which the manufacture spread to Spain and Flanders. Pillow lace was first made in the Low Countries.

Lace-bark Tree, is a native tree of the West Indies. It receives its common name from the fact that when its inner bark is cut into thin pieces, after maceration it assumes a beautiful net-like appearance. It is used by females by way of ornament, and the negroes manufacture matting from it.

Lacedæmonians. See *Sparta*.

Lacépède (lâ-sā-pād'), Bernard Germain Etienne de la Ville-sur-Illon, Count de (1756–1825), French naturalist. In 1791 he

was elected member of the legislative assembly, and belonged to the moderate party. During the reign of terror he found refuge in the country. Napoleon made Lacépède a member of the conservative senate, and conferred on him the dignity of grand chancellor of the Legion of Honor. After the restoration he was made a peer of France. His *History of Fishes* is considered his principal work.

Lace-winged Flies, insects so called from their delicate wings having many netted spaces like lace. The larvæ are exceedingly voracious, and feed upon aphides.

Lachaise (lă-shāz), François d'Aix de (1624–1709), confessor of Louis XIV, member of the congregation of Jesuits. Lachaise commenced his course of studies in the Jesuit college at Rohan, and finished it at Lyons. He had much influence with the king, and acting with prudence and moderation, he kept the post till his death. He left philosophical, theological, and archæological works. Louis XIV had a country house built for him to the west of Paris, the extensive garden of which now forms the cemetery of Père Lachaise, the largest in Paris.

Lachesis (lak'e-sis), the name of one of the three Fates in classical mythology whose duty it was to spin the thread of life.

Lachine (lă-shēn), a village of Canada, prov. Quebec, on Montreal Island. There are here rapids on the St. Lawrence which are avoided by means of a canal 9 mi. long from Montreal harbor to a point above them. The "shooting" of the rapids is a favorite trip for tourists.

Lachlan, a river of Eastern Australia. It has a total length of about 700 mi.

Lachrymæ Christi (lak'ri-mē kris'tī) (literally "tears of Christ"), a sweet but piquant muscadel wine of agreeable flavor produced from grapes grown on Mount Somma, the second summit of Vesuvius. There are two kinds, the white and the red, of which the former is generally preferred.

Lachrymatory (lak'-), a small glass vessel found in ancient sepulchers, in which it has been supposed the tears of a deceased person's friends were collected and preserved with the ashes and urn.

Laconia, Belknap co., N. H., 27 mi. n. e. of Concord. Railroad, Concord & Mont. Industries: hosiery, yarn, and woolen goods are manufactured; railroad cars are also made. Pop. 1900, 8,042.

Lacquer (lak'ẽr), ornamental or useful articles of brass, such as gas fittings and some kinds of furniture, are usually lacquered to preserve the surface from discoloration or corrosion. Iron, tinplate, and other metals, and alloys are also sometimes lacquered. The lacquer used is composed essentially of shellac or seed-lac, or both, dissolved in spirits of wine. But its composition varies considerably. One kind consists of 2 parts of shellac dissolved in 20 parts by weight of alcohol, less than 1 part of turpentine being mixed with it. It is customary, however, to add small quantities of one or more gum resins, such as sandarach, amber, and anime, to the lacquer, which is colored with gamboge, dragon's blood, and other substances. The brass, which is first heated till the hand can just safely touch it, generally receives two coats of lacquer; but sometimes the first coat is put on when the metal is cold. In the case of dark lacquering the brass is first bronzed and coated with black lead. Coal and tobacco smoke, as well as the vapor or fumes of some chemical substances, injure lacquered surfaces.

Lacquer Ware.—The lacquer used for the celebrated lacquer ware of Japan differs entirely from the lacquer used for brass. The body of this ware is of wood, and the lacquer or varnish with which it is coated is the juice of the lacquer tree, sometimes also called the varnish tree. This remarkable lacquer not only forms a very hard surface, but, unlike other varnishes, it stands a considerable heat without injury, so that in Japan lacquered vessels are used for hot soups and hot alcoholic drinks. There are numerous kinds of Japanese lacquer ware, the simplest kind being perhaps that with the grain of the wood seen, for which a fine transparent lacquer is used. For black lacquer ware the juice or varnish is darkened with galls and a salt of iron, and for red it is mixed with about 20 per cent. of cinnabar; orpiment, oxide of iron, and Prussian blue being also used as colors. In the case of gold and silver lacquer wares the varnish is mixed with about 30 per cent. of the powder of these metals in a fine state of division, so that when the surface is polished it shows a metallic luster. Tin is used to imitate gold, the yellow hue being given by color in the varnish.

The lacquered surface of the best ware is prepared by a very tedious process, owing to the number of coatings it receives. For the several preliminary ones crude lacquer is used, together with a single coating of powdered biscuit earthenware and water, the surface being rubbed with a whetstone after each. Two or three more coatings of lacquer are next applied, each being rubbed with charcoal and water. For the finishing coat the best lacquer is employed, and this is polished with calcined deer horn, finely powdered, the finger and a little oil bringing up the final gloss. The various articles made, such as boxes, vessels, trays, cabinets, etc., are decorated either by inlaying with metal, ivory, or mother of pearl, by speckling and gilding with gold or silver, by designs in color, by relief paintings, or by carving. The art of lacquering is a very ancient one in Japan, and fine specimens of old work bring very high prices.

La Crosse, La Crosse co., Wis., on Mississippi River, 130 mi. s.e. of St. Paul. Railroads: C. M. & St. P.; C. & N. W.; C. B. & N.; and G. B. W. & St. P. Industries: It has large manufacturing interests including extensive foundries and machine shops, large breweries, flouring mills, plow and farm implement works. It is an important lumber manufacturing point, converting annually over 300,000,000 ft. of lumber into boards, shingles and laths. It has a large shipping trade. Pop. 1900, 28,895.

La Crosse, a game at ball, originating with the Indians of Canada, played somewhat on the principle of football, except that the ball is carried on an implement called the *crosse*, the player in possession running with it toward the enemy's goal, and when on the point of being caught, passing it by tossing to one of

The Crosse and Ball.

his own side, or throwing it over his head as far in the direction of the goal as possible.

Lactic Acid, an acid found in several animal liquids, and particularly in human urine. It is not only formed in milk when it becomes sour, but also in the fermentation of several vegetable juices, and in the putrefaction of some animal matters. It is a colorless, inodorous, very sour liquid, of a syrupy consistence. It coagulates milk.

Lactine (Lactose), sugar of milk, a substance obtained by evaporating whey, filtering through animal charcoal, and crystallizing. It forms hard, white, semi-transparent, trimetric crystals, which have a slightly sweet taste, and grate between the teeth. It is convertible like starch into glucose by boiling with very dilute sulphuric acid.

Lactom'eter (or Galactometer), an instrument for ascertaining the different qualities of milk. Several instruments of this sort have been invented. One consists of a glass tube 1 ft. long, graduated into 100 parts. New milk is filled into it and allowed to stand until the cream has fully separated, when its relative quantity is shown by the number of parts in the 100 which it occupies.

Lactuca'rium, the inspissated milky juice of several species of lettuce. It possesses slight anodyne properties, and is sometimes used as a substitute for opium.

Ladakh', a governorship under the maharajah of Cashmere, India; area 30,000 sq. mi.; capital Le or Leh. The wool of the goats which are raised here is the well-known shawl wool of Cashmere. There is a considerable transit trade, Ladakh being naturally the great thoroughfare between Chinese Tartary and Thibet on the one hand, and the Punjab on the other. The trade is supervised by two commissioners, one native and one British. The language is Thibetian, and the government a despotism controlled by the priesthood. The inhabitants are of Mongolian race and Buddhist religion. Polyandry prevails. Pop. est. at from 168,000 to 200,000.

Lad'oga, a lake of Russia; area 7,156 sq. mi. It is the largest lake in Europe. The navigation is dangerous for small craft, and canals along the southern shore connect the rivers Volkhor and Neva. The fishing on the lake is important.

Ladrones (la-drōnz', or la-drō'nes) (or Marianne Islands), a group of sixteen islands in the North Pacific Ocean, east of the Philippines and the Caroline Islands. Guam is the southernmost and largest; next in importance is Rota. The islands are mostly of volcanic origin, and are very rugged, but their general aspect is picturesque, being densely wooded and covered with a perpetual verdure; the soil also is extremely fertile. The islands were discovered by Magellan in 1521. Excepting Guam, the whole group was sold by Spain to Germany in June, 1899.

Lady-bird, the name of a number of small insects, or beetles, common on trees and plants in gardens. They form the genus *Coccinella* of Linnæus. They are usually ornamented with scarlet spots. They are of great service to cultivators on account of the number of aphides or plant-lice which they destroy.

Lady-bird (magnified).

Lady Fern, a species of fern common in Great Britain. It has bipinnate or tripinnate fronds of delicate texture, and of a remarkably elegant plumy structure.

Lady's Mantle, a British plant of the rose family, with rather large seven to nine lobed

Alpine Lady's Mantle; *a*,— flower.

leaves (whence the name) and small greenish yellow flowers.

Lady's Slipper, a beautiful genus of orchideous plants, conspicuous for its large inflated flowers. The species are confined to the northern regions of the globe. Three species are natives of the U. S. *C. Arietinum*, found from Canada to Vermont, remarkable for the singular form of the lips, readily suggests the name. See colored plate, Flowers.

Laennec (lā-en-nek), René Theophile Hyacinthe (1781–1826), French physician. His fame rests on the splendid discovery of mediate auscultation, that is, of the use of the stethoscope. The original discovery, however, is claimed for Avenbrugger.

Lafayette, Marie Paul Jean Roch Yves

Gilbert Motier, Marquis de (1757–1834). He commenced his career at the court of Louis XV, at the period when hostilities were commencing between Britain and the American colonies. In 1777 he left France for America, having fitted out a vessel for himself, and was received by Washington and his army with acclamation. He joined the ranks as a volunteer, was wounded near Philadelphia, and commanded the vanguard of the American army at the capture of Cornwallis. He returned to France on the close of the campaign; was called to the Assembly of the Notables in 1787, and was elected a member of the States-General, which took the name of *National Assembly* (1789). In the assembly he proposed a declaration of rights, and the decree providing for the responsibility of the

Lady's Slipper flower and leaf.

officers of the crown. Two days after the attack on the Bastile he was appointed (July 15) commander in chief of the National Guards of Paris. It was through his means that the king and queen were saved from the mob that had taken possession of the palace at Versailles. After the adoption of the constitution of 1790 he resigned all command, and retired to his estate of La Grange. In 1792 he was appointed one of the three major generals in the command of the French armies, and directed some small operations on the frontier of Flanders, at the same time striving unsuccessfully to defeat the Jacobins at Paris. Commissioners were sent to arrest him, on which he determined to leave the country and take refuge in some neutral ground. Having been captured by an Austrian patrol he was confined at Olmütz till 1797. In 1818 he was chosen member of the Chamber of Deputies, and was a constant advocate of liberal measures. In 1824 he visited the U. S., and was received with great enthusiasm. Congress voted him $200,000 and a township of land. During the revolution of July, 1830, he was appointed general of the National Guards of Paris, and it was chiefly to him that Louis Philippe owed his elevation to the throne.

Lafayette, Tippecanoe co., Ind., on Wabash River, 64 mi. n.w. of Indianapolis. Railroads: Wabash; C. C. C. & St. L.; L. N. A. & C.; and Lake Erie & Western. Industries: railroad shops, iron foundries, flouring mills, machine shops, knitting mills, saw mills, bicycle, wagon, carpet factories, and safe and lock works. The town was first settled in 1811 shortly after the battle of Tippecanoe (battlefield 7 m. from city). It is the seat of Purdue University. Pop. 1900, 18,116.

Lafayette College, a flourishing institution at Easton, Pa., chartered in 1826. It has six degree courses of four years each—three general and scientific, and three technical.

Lafitte, Jean (1780–1826), was b. in France. He arrived in New Orleans about 1809, and later became leader of a band of smugglers and was outlawed. He was the source of much annoyance to the state of Louisiana, but was finally employed by the governor of the state in the defense of New Orleans. He d. in Texas.

Lafontaine (lå-fon-tān), Jean de (1621–1695), French writer. He was invited to Paris by the Duchess de Bouillon, and after being patronized by several persons of distinction Madame Sablière took him into her house and freed him from domestic cares. He was in habits of intimacy with Molière, Boileau, Racine, and all the first wits of Paris, by whom he was much beloved for the candor and simplicity of his character. But he was no favorite with Louis XIV, who even hesitated some time to confirm his nomination to the French Academy. The first volume of his *Contes* or *Tales* appeared in 1664, a second in 1671. Of his *Fables* (in which animals are represented speaking and acting) innumerable editions have been printed, and it is through them that he is universally known.

Lago Maggiore (må-jō're) (anciently *Verbanus*), a lake partly in Northern Italy, partly in Switzerland, about 39 mi. long and 7 broad, traversed by the Ticino. It is 621 ft. above the level of the sea, and at the northern end in some places as deep as 2,500 ft. Its banks abound in every Alpine beauty, and are adorned with a number of picturesquely situated villages and towns. On all sides it is surrounded by hills, and it contains several islands.

Lagos, a British colony on the Bight of Benin, Guinea coast, West Africa. It consists of the island and town of Lagos, with Bedagry, Palma, and Leckie on the mainland. Area 1,071 sq. mi. The chief article of commerce is palm oil. Acquired by Britain in 1861, Lagos and the Gold Coast were for some time under one governor; but in 1886 Lagos was put under an independent administrator of its own. Pop. 75,270.

La Hogue (og), a cape of Northern France, forming the point of the peninsula on which is Cherbourg, department of La Manche. A naval battle was fought here, May 19, between the French under Tourville and the British and Dutch under Admirals Russell and Rooke, in which the latter were victorious.

Lahore', a city of Hindustan, capital of the

Punjab, and administrative headquarters of Lahore division and district, 265 mi. n.w. of Delhi. It covers an area of 640 acres, and is surrounded by a brick wall 16 ft. high, flanked by bastions. The streets are exceedingly narrow, unpaved, and dirty; and the houses have, in general, a mean appearance. The most remarkable buildings are the mosques of Aurengzebe, of Vizier Khan, and of Sonara; the mausoleum of Runjeet Singh, etc. The European quarter lies outside the walls on the south, and dates from 1849. Among the public buildings and institutions are the Punjab University, the Oriental College, Medical School, Law School, Mayo Hospital, etc. In 1524 Lahore became the seat of the Mogul Empire, under which it reached its greatest splendor. Before passing into the hands of the British it was the capital of the Sikhs. Pop. 176,854.

Laibach (or Laybach) (lī'bȧh), a town of Austria, duchy of Carniola, of which it is the capital. Its principal buildings are the cathedral of St. Nicholas, with fine pictures, frescoes, and carvings; the old Gothic townhouse; the old castle; lyceum and other educational institutions. It manufactures woolen and cotton goods, paper, etc. Pop. 30,691.

Laing, Alexander Gordon (1793–1826), African traveler, b. at Edinburgh. After serving in the army and attaining the rank of major, he entered, in 1822, on his career as an African traveler. The results of his early journeys in West Africa were published in 1825. He explored the upper course of the Niger, and was assassinated by his guide near Timbuctoo.

Laisser Faire (lā-sā-fār), in economics, a term applied to the theory that a public authority should interfere in the concerns of a community as little as possible; that wealth tends to be produced most amicably and economically where a government leaves individuals free to produce and transfer on mutually arranged terms, confining itself to the protection of property and person and the enforcement of contracts. This rule in practise is limited by various exceptions, as in government interference in the matters of education and the employment of children; in the promotion of health or morality; and in the private economic interests of certain industrial classes.

Lake, a large sheet or body of water, wholly surrounded by land, and having no direct or immediate communication with the ocean, or with any seas, or having such only by means of rivers. It differs from a pond in being larger. Lakes are divided into four classes: 1, Those which have no outlet, and receive no running water, usually very small. 2, Those which have an outlet, but receive no superficial running waters and are consequently fed by springs. 3, Those which receive and discharge streams of water (by far the most numerous class). 4, Those which receive streams, and which have no visible outlet, being generally salt, as the Great Salt Lake, Caspian Sea, and Lake Aral.

Lake Dwellings, the name given to habitations built on small artificial or partly artificial islands in lakes, or on platforms supported by piles near the shores of lakes. The use of habitations of this nature is a subject which has engaged the attention of archæologists and others very largely since the discovery of the remains of a lake dwelling in Ireland in 1839, of similar ones in Switzerland in 1854, and subsequently of numbers of others elsewhere. The archæological interest thus attaching to these lacustrine remains has drawn attention to the fact of similar dwellings being still used in various parts of the world, in Russia, the Malay Archipelago (Borneo and New Guinea), the Caroline Islands, Lake Maracaybo in Venezuela, New Zealand, and in a modified form in some parts of Central Africa. The first who is known to have described lake dwellings is Herodotus, who mentions certain dwellings of this kind on Lake Prasias in Thrace as being approached by a narrow bridge, each habitation having a trapdoor in the floor, giving access to the water beneath, through which fish were caught. A great number of these *pfahlbauten* (pile structures) have been discovered in the Swiss lakes, some belonging to the Iron Age, some few even to the Roman times; but the greatest number appear to be divided in about equal proportions between the Stone and Bronze Ages. The Celtic lake dwelling, called *crannoges,* are more or less artificial islands composed of earth and stones strengthened by piles; those of Ireland being of a much later date than those of Switzerland, and are frequently noticed in early history as strongholds of petty chiefs. Similar structures are not infrequent in Scotland. The relics found in these buildings have thrown much light on prehistoric man, large populations having occupied these pile buildings during extended periods of time. Dr. Keller, of Zurich, first described the lake dwellings of the European continent, his work being translated into English under the title of *Lake Dwellings of Switzerland and Other Parts of Europe,* by J. E. Lee, 1878.

Lake of the Thousand Islands, an expansion of the river St. Lawrence, soon after it leaves Lake Ontario, between Canada and the state of New York. It contains about 1,700 small islands.

Lake of the Woods, a lake on the southern frontier of British America, and partly within the U. S., 220 mi. w. of Lake Superior. It is upward of 70 mi. in length, has an extremely irregular form, and a coast line of about 250 mi. It is studded with numerous wooded islands. Rainy River, the principal feeder of the lake, enters it at its southeastern extremity; its discharge is at the north by the river Winnipeg.

Lakes, pigments consisting of a coloring matter combined with a metallic oxide. They are obtained by mixing with a solution of the coloring matter a solution of alum or of a salt of tin, tungsten, zinc, lead, or other metal, and then adding an alkali or alkaline carbonate. Among the pigments prepared in this way may be mentioned *blue* lake, consisting of

cobalt blue, indigo, or ultramarine and alumina; *madder* lake, of madder and alumina; *orange* lake, of turmeric and alumina; *carmine* lake, of cochineal and alumina; *purple* lake, of logwood and alumina; and so on. Lake pigments are used in painting, calico printing, and in the manufacture of wall paper.

Lakes, The Great, the five vast inland freshwater bodies of water connecting with each other in the northern portion of the U. S., named Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario. The first named is the largest body of fresh water on the globe, its greatest length e. and w. is 360 mi., greatest breadth 140 mi.; area 32,000 sq. mi., elevation above the sea about 630 ft. On the s. and w. it borders on the states of Michigan, Wisconsin, and Minnesota. The coast is mostly rocky; its most important port is Duluth, Minn. It discharges through St. Mary's River into Lake Huron. Lake Michigan has a length of 320 mi. n. and s., a mean breadth of 70 mi., a mean depth of 1,000 ft., an elevation of 589 ft. above sea level, and an area of 22,400 sq. mi. On the northeast it connects with Lake Huron by the Straits of Mackinaw. Lake Huron lies between lat. 43° and 46° 15′ n. and lon. 80° and 84° 40′ w. Its length is 250 mi., width 190 mi., area about 21,000 sq. mi.; elevation above the sea, 580 ft.; average depth 800 to 1,000 ft. Lake Erie is the southernmost of the five lakes, and is 240 mi. long by a mean breadth of 40 mi.; area 9,600 sq. mi.; elevation above the sea, 570 ft. Its surface is 333 ft. above that of Lake Ontario, this difference being caused by the Niagara River, which is the outlet of Lake Erie. Lake Ontario is the lowest and smallest in area of the great chain, lying between the state of New York and the province of Ontario, and has a length of 180 mi. by a mean breadth of 35 mi., and a depth supposed to average 500 feet; elevation above the sea, about 240 ft.; area about 6,300 sq. mi.

Lake School (or Lake Poets), a name given by the *Edinburgh Review* to Wordsworth, Coleridge, Southey, Wilson, etc. They had little in common except their non-classicism, and received the name from residing in the Westmoreland and Cumberland Lake district.

Lakshmi, in Hindu mythology, the wife of Vishnu. She sprang in full perfection from the froth of the ocean. She is the Hindu Venus, the ceres or goddess of abundance, and the goddess of prosperity. Flowers and grain are the offerings most commonly given to her.

Lalande (là-länd), Joseph Jérome le Français de (1732–1807), French astronomer. He was sent by the academy in 1751 to Berlin to determine the parallax of the moon, while Lacaille went with the same object to the Cape of Good Hope. After having finished his operations at Berlin, he was chosen member of the Academy of Sciences in Paris in the year 1753. In 1762 he was appointed professor of astronomy in the Collége de France, where he lectured with immense success to the end of his life. Chief works: *Treatise on Astronomy; History, Theory, and Practise of Navigation;* and *Astronomical Bibliography.*

Lalit'a-Patan, a town in Northern Hindustan, in Nepaul, near the south bank of the Baghmati, and two mi. s. s. w. from Khatmandu, with which it is connected by a bridged road. It is an old place, and contains many Buddhist temples. Pop. 24,000.

La'maism, a variety of Buddhism, dating from the seventh century after Christ, and chiefly prevailing in Thibet and Mongolia; so called from the *lamas* or priests belonging to it. The highest object of worship is Buddha, who is regarded as the founder of the religion, and the first in rank among the saints. The other saints comprise all those recognized in Buddhism, besides hosts of religious teachers and pious men canonized after their death. The clergy are the representatives or reincarnations of these saints on earth, and receive the homage due them. Besides these saints a number of inferior gods or spirits are recognized by Lamaism and receive a certain worship. The Lamaists have a hierarchy in some respects resembling that of the Catholic Church, and they have also monasteries and nunneries, auricular confession, litanies, etc., and believe in the intercession of the saints and in the saying of masses for the dead. In the hierarchy there are two supreme heads, the *Dalai-lama* and the *Tesho-lama,* in whom Buddha is supposed to be incarnate. Next in rank to these two grand lamas are the incarnations of saints, after which follow those of patrons or founders of lameseries, or Buddhistic monasteries, and then the lower ranks, distinguished merely by talents or learning. The *Dalai-lama* and *Tesho-lama* are nominally coequal in rank and authority; but the former, from possessing a much larger territory, is in reality much the more powerful. The former, whose residence is at Potala, near Lassa, is the acknowledged head of the Buddhists not only in Thibet, but throughout Mongolia and China. When either of the two lamas dies, his place may be filled according to directions given by himself before his death, stating into what family he purposed transmigrating. If such directions have not been given, the other procures the names of male children born at the time of the death in order to discover where the deceased has incarnated himself. The question is decided by lot in presence of the surviving grand lama and the Chinese political resident, and the child whose name is drawn becomes the grand lama.

Lamar, Lucius, Q. C. (1825–1893), b. in Putnam co., Ga., was educated at Emory College, studied law and was admitted in 1847; moved to Mississippi and was elected representative in 1856. In 1861 he resigned and joined the Confederate army as colonel. He was professor of law in the University of Mississippi, 1867–1872 when he was again sent to Congress. In 1876 he was elected senator and was reelected in 1882. In 1885 he became secretary of the interior in President Cleveland's cabinet, and in 1887 was appointed associate justice of the Supreme Court of the U. S.

Lamarck, Jean Baptiste Pierre Antoine de Monet, Chevalier de (1744–1829), French naturalist. He was educated for the church,

but ultimately entered the army, and served in the Seven Years' War. Disabled by an accident, he repaired to Paris and devoted himself to the study of medicine and physical science. He became botanist of the Jardin du Roi in 1788, and professor of zoology at the Museum of Natural History in 1793. His chief works are *Philosophie Zoologique*, in which he promulgated a theory foreshadowing what is now known as the law of evolution; *Histoire Naturelle des Animaux Vertebres*, *Tableau Encyclopedique de la Botanique*, etc. He held the doctrine of spontaneous generation, and his religious beliefs have been described as a curious mixture of pantheism and deism.

Lamarmora, ALFONSO, MARQUIS (1804–1878), Italian soldier and statesman. He left the military academy of Turin in 1823, and thenceforward devoted himself to army reform. He was engaged in checking the revolutionary movements of 1848, and soon after became minister of war. In 1854 he commanded the Sardinian troops in the Crimea. He accompanied Victor Emmanuel to the field in 1859 against Austria, and after the peace, became president of the council. He was ambassador to Prussia in 1861, to France in 1867, and was governor of Rome 1870–71.

Lamartine (lȧ-mȧr-tēn), ALPHONSE MARIE LOUIS PRAT DE (1790–1869), French poet and statesman. By his first production, *Méditations Poétiques* (1820), he at once obtained a high place among the poets of the day. In 1820 he was attached to the legation at Naples, and married a rich English lady, Eliza Marianna Birch. The *Nouvelles Méditations Poétiques* (1823), and the *Harmonies Poétiques et Religieuses* (1828), established his poetic fame, and obtained for him admission into the French Academy (1830). After the revolution of July, he traveled in the East, and on his return published *Voyage en Orient. Souvenirs, Impressions, Pensées et Paysages.* During his absence he had been elected a member of the Chamber of Deputies, and thenceforward his career was as much political as literary. In 1847 he published his *Histoire des Girondins*, in which he manifested strong republican leanings. After the February revolution of 1848 he became a member of the provisional government, in the capacity of minister of foreign affairs. For some months he enjoyed unbounded popularity, and his energetic behavior was on more than one occasion the means of averting incalculable evils. After the insurrection of June, 1848, he lost his popularity, and in 1851 withdrew from public life. He was latterly much impoverished, and was voted an annuity in 1867.

Lamb, CHARLES (1775–1834), English essayist and humorist. He was educated at Christ's Hospital, where he formed his long friendship with Coleridge. The whole course of his domestic life was devoted to the safe-keeping and care of his sister Mary, who in a fit of acute mania had stabbed her mother to the heart in 1796. His first appearance as an author was in 1798, when he published a volume of poems in conjunction with his friends Coleridge and Lloyd. His love for seventeenth century literature bore fruit in the *Tales from Shakespeare* and *Specimens of English Dramatic Poets* who lived about the time of Shakespeare. He made two attempts at the drama. *John Woodvil*, written in imitation of the early English dramatists; and a farce entitled *Mrs. H.*, which was performed at Drury Lane in 1806, and proved a failure. On the other hand, his tale of *Rosamund Gray* (Lond. 1798) was well received when it appeared, and is still a favorite. He owes his literary distinction to his delightful *Essays of Elia*, chiefly contributed to the *London Magazine.* They have been frequently republished in a collected form. Here, in a style ever happy and original, he has carried the short humerous essay to a point of excellence perhaps never before attained. — His sister MARY ANNE (1765–1847), was joint author with her brother of *Mrs. Leicester's School, Tales from Shakespeare*, and *Poetry for Children.* Pl. 2, Vol. I.

Lambayeque (lȧm-bȧ-yā′kā), a town in Peru, capital of the department of the same name, 6 mi. from the sea, on the river Lambayeque. Pop. 6,284. Area of department 17,939 sq. mi.; pop. 85,984.

Lambert's Pine, a N. A. pine growing in California, and sometimes reaching the height of 300 ft. It yields when burned a sugary substance known as California manna. The leaves are in fives; the cones are 14 to 18 in. long, and contain edible seeds.

Lamennais (lȧ-men-ā) HUGUES FÉLICITÉ ROBERT DE (1782–1854), French writer on religion and politics, b. at St. Malo. He was ordained priest in 1816, and first attracted attention by his apology for Roman Catholicism, the *Essai sur l'Indifférence en Matière de Religion.* In 1824 he declined the offer of a cardinal's hat, and the following year published a work favoring ultramontane doctrines, *La Religion Considérée dans ses Rapports avec l'Ordre Civil et Politique.* From this time he began to preach the separation of church and state, as he believed he could only deliver the former by freeing it from the yoke of the latter. In 1834 he finally revolted from Rome in his *Paroles du'n Croyant* (Words of a Believer). This book, which produced an almost unexampled sensation, passed in a few years through more than 100 editions, was translated into almost all living languages, and reprinted in almost all foreign countries. It was condemned by the pope, and Lamennais answered by the *Affaires de Rome.* His subsequent works were all extremely democratic, and he gradually became both atheist and socialist.

Lamentations, the name given in the authorized version of the Scriptures to a pathetic poem made up of five distinct elegies. They appear in the Hebrew canon with no name attached, but ancient tradition, internal evidence, and a prefatory verse which appears in the Septuagint, point to the authorship of Jeremiah. The first four of the dirges are alphabetical acrostics, successive verses, or in chap. 3, successive sets of three verses, beginning alphabetically. Chapter 5 is not in acrostic

form. According to Josephus, Jerome, and also some modern critics these poems were written on the death of King Josiah (see 2 Chron. 35 : 25), but the contents of the book itself plainly show that a national calamity — the destruction of Jerusalem and the overthrow of the Judean state by the Chaldeans — is referred to.

Lämmergeier (lem'ĕr-gī-ĕr) (German, "lamb vulture"), the bearded vulture, a bird of prey of the genus *Gypaëtos*, forming a link between the vultures and the eagles. It inhabits the Swiss and German Alps, as well as the higher mountains of Asia and Africa, and is the largest European bird of prey, measuring up-

Lammergeier.

ward of 4 ft. from beak to tail, and 9 or 10 in the expanse of its wings. Besides eating carrion, it preys on living chamois, lambs, kids, hares, and such like animals, but it does not disdain, when pressed, rats, mice, and other small quadrupeds.

Lammermuir Hills, a range of Scottish hills. Highest summit Lammer Law, 1,733 ft.

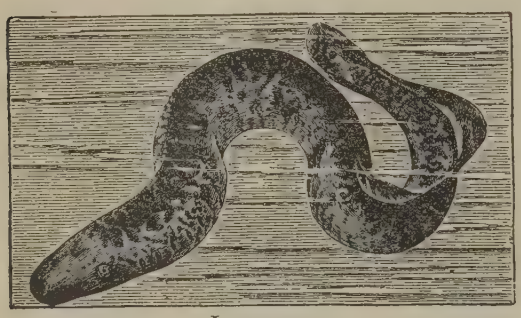
La Motte, JEANNE DE VALOIS, COMTESSE DE (1756–1791), French adventuress, a descendant of the family of Valois by an illegitimate child of Henry II, and notorious for the part she played in the "diamond necklace" fraud. She married the Comte de la Motte, a penniless adventurer, and settled in Paris about 1780. In the years 1783–84 the Prince-cardinal de Rohan, who had fallen into disgrace, was persuaded by her that the Queen Marie Antoinette regarded him with much favor, which would be increased if he would assist her in purchasing a valuable diamond necklace which Louis XV had ordered for Madame du Barry, but which was still in the jeweler's hands. The cardinal fell into the snare; he agreed to stand surety for the payment, and the necklace was delivered to him. Cagliostro, and probably the queen also, was in the plot; the necklace disappeared, was broken up and sold, probably by the La Mottes. The jeweler, after waiting a long time for his money, applied direct to the court, and the plot was discovered. Cagliostro, the cardinal, and others were thrown into the Bastile, but at the trial only the La Mottes were convicted. They escaped to England, where the comtesse wrote *Mémoires* implicating the queen in the fraud. She was killed by falling out of a window.

Lamp, a contrivance for producing artificial light, whether by means of an inflammable liquid, or of gas, or electricity; but usually the term applied to a vessel for containing oil or other liquid inflammable substance, to be burned by means of a wick. Baked earth was probably the substance of which the earliest lamps were composed, but subsequently we find them of various metals—of bronze more particularly. Modern lamps vary in form and principle widely, and of late have been constructed in a variety of materials. The requisite properties of a perfect lamp are these: 1, it must be supplied with carbonaceous matter and with oxygen; 2, it must convert the former into a gaseous state; and 3, it must bring the gas so produced in contact with oxygen at such a temperature that the carbon will combine with the oxygen in the fullest degree to produce the greatest quantity of flame without any smoke. Until 1784 all the lamps in use were far from meeting all the requirements. In that year an improved scientific lamp was constructed by Aimé Argand of Geneva, and called after him the Argand lamp. In this lamp defective consumption is remedied by using a circular wick, the flame of which is nourished by an internal as well as an external current of air, and by placing a glass chimney above the flame so as to increase the draught. A special arrangement ensures a uniform supply of oil. In the improved lamps that have succeeded that of Argand, the Argand burner has generally been retained, and the alterations have chiefly been made in the mode of keeping up a uniform supply of oil. The moderator lamp, invented by M. Franchot in 1837, long held a favorite place. In it the oil is contained in a reservoir at the bottom of the lamp. The reservoir is cylindrical in shape, and in the interior there is a piston which is pushed down on the oil by a spiral spring, causing the oil to ascend in the tube in which the wick is inserted. Since the invention of this lamp various modifications have been made in it by different manufacturers. For petroleum, paraffin, and other mineral oils, which have of late years come into very extensive use for illuminating purposes, a very simple kind of lamp is used. The oil-vessel is placed below the burner, which usually consists of a simple slit, down which a broad wick passes into the oil. The wick may be raised or depressed by a screw, and when the lamp is burning, is kept a short distance below the opening of the slit. The oil is sucked up by the wick by the action of capillarity. A chimney is fitted on to the lamp, and creates so powerful a draft that the flame is kept perfectly steady, and the gas

proceeding from the heating of the oil is completely consumed. There is an endless variety of lamps of this kind, the special features aimed at being increase of light by improved burners and immunity from explosion. Safety-lamps are used for mines. Hydro-carbon lamps are used for magic-lanterns, etc. The magnesium lamp, chiefly used by photographers, is one constructed for the combustion of magnesium wire. A *lantern* is a form of lamp, generally a case inclosing a light and protecting it from wind and rain, sometimes portable and sometimes fixed.

Lampblack, a fine soot formed by the condensation of the smoke of burning oil, pitch, or resinous substances in a chimney terminating in a cone of cloth. It is used in the manufacture of pigments, blacking, and printing inks. See *Carbon.*

Lam'prey, the popular name of several species of eel-like, scaleless fishes which inhabit both fresh and salt water. The lampreys have seven spiracles or apertures on each side of the neck, and a fistula or aperture on the top of the head; they have no pectoral or ventral fins. The mouth is in the form of a sucker,



Lamprey.

lined with strong teeth and cutting plates, and the river lampreys are often seen clinging to stones by it. The marine or sea lamprey is sometimes found so large as to weigh 4 or 5 lbs. It is of a dusky brown, marbled with yellowish patches, is common round the British coasts, and is also found in the Mediterranean. It ascends rivers in the spring for the purpose of spawning, and was formerly much valued as an article of food. The river lamprey or lampern is a smaller species, and abounds in the fresh water lakes and rivers of northern countries. It is colored black on its upper, and of a silvery hue on its under surface. Lampreys attach themselves to other fishes and suck their blood; they also eat soft animal matter of any kind.

Lamp Shells, the familiar designation of certain Molluscs, especially those of the genus *Terebratula,* the bivalve shells of which when closed bear a close resemblance to the shape of the old Roman or classical lamp.

Lamu, an island and town on the coast of East Africa, lat. 2° 20′ s., the administration of which was granted in 1889 to the Imperial British East Africa Co. Pop. 10,000.

Lan'ark, Lanarkshire, or Clydesdale, a s.w. county of Scotland, and the most populous in the country; area 564,284 acres. The county is rich in coal, ironstone, limestone, and sandstone, which are very extensively wrought. The chief towns are Glasgow, Coatbridge, Airdrie, Hamilton, Rutherglen, Motherwell, Wishaw, and Lanark, the county town, which is smaller than the others. Pop. 1,045,787. LANARK, the town, is a royal and parliamentary burgh. Not far from Lanark are the Falls of the Clyde, in a romantic and richly wooded part of the valley, which render the town a favorite resort for tourists.

Lan'cashire, or the county palatine of Lancaster, a maritime county in the n.w. of England, area 1,207,926 acres. The peat-mosses or bogs of Lancashire form one of its most remarkable physical features. The most important mineral products of Lancashire are coal, iron, lead and copper. Lancashire is the grand seat of the cotton manufacture, not only of England, but also of the world, Manchester being the principal center. Woolen goods are largely produced, as are also machinery of all descriptions, and a vast variety of other articles. Liverpool is the great shipping port of the county and of England. Lancaster is the county town. Pop. 4,406,787.

Lan'caster, England, the county town of Lancashire. It occupies the acclivities of a hill, on the summit of which stands the castle, now used as the county jail, built in the reign of Edward III, but with a keep supposed to be Saxon, and with a tower on the southeast attributed to the Emperor Hadrian. The industries comprise furniture, cordage, sail cloth, and cotton goods, floor cloth, oil, varnish works, railway rolling stock, etc. Pop. 31,038.

Lancaster, county seat of Lancaster co., Pa., 68 m. w. of Philadelphia; on the Conestoga river, and on the Reading & Columbia, the Phil. & Reading, and the Pennsylvania railroads. It is in a rich wheat and tobacco growing region and is the center of a large trade in tobacco and grain. It has many cigar and cigarette factories, cotton mills, cork works, caramel factories, iron works, carriage works, brick factories and manufactures of watches, emery wheels and umbrellas. The city was settled about 1718 and at first called Hickory Town. In 1729, it received its present name, was chartered as a borough in 1742 and became a city in 1818. Lancaster was the capital of the state from 1799 to 1812. It is the seat of Franklin and Marshall College, with the Theological Seminary of the Reformed Church in the U. S. The First Pennsylvania State Normal is at Millersville, near Lancaster. The city has a mechanics' library, the Lancaster General Hospital, St. Joseph's Hospital, Stevens' Home and the Children's Home. Pop. 1900, 41,459.

Lancaster, Fairfield co., O., 30 mi. s. of Columbus. Railroads: C. H. V. & J., and C. & M. V. Industries: railroad shops, three shoe factories, four flouring mills, woolen mill, and agricultural implement company. Gas in abundance. Surrounding country agricultural. The birthplace of General and Hon.

John Sherman. The town was first settled in 1800. Pop. 1900, 8,991.

Lancaster, House of, the name given in English history to designate the line of kings —Henry IV, V, and VI, immediately descended from John of Gaunt, fourth son of Edward III. Edmund, second son of Henry III, was created earl of Lancaster and Leicester. His son Thomas added Derby and Lincoln to his titles, became leader of the baronial opposition to Edward II, and was beheaded for treason. His grandson was advanced to the dignity of a duke, and dying without male issue, the inheritance fell to his daughter Blanche, who became the wife of John of Gaunt.

Lancaster, John of Gaunt, Duke of. See *John of Gaunt.*

Lancaster Gun, named from the inventor, a species of rifled but not grooved cannon, having an elliptical bore, of which the major axis moves round till it traverses one fourth of the circumference of the bore. The projectiles are also elliptical, so that when the gun is fired the projectile follows the twist of the bore, acquiring a rotary motion.

Lancaster Sound, a passage leading from the n.w. of Baffin's Bay w. to Barrow's Strait. It was discovered by Baffin in 1616, is about 250 mi. long, with a central breadth of about 65 mi.

Lance, a weapon consisting of a long shaft with a sharp point, much used before the invention of firearms, and still in use. It was common among the Greeks and Romans. The Macedonian phalanx was armed with it, and it was the chief weapon of the Roman infantry. The javelin, or *pilum,* was but secondary. The lance was the chief weapon in the Middle Ages, and was especially the arm of knighthood. The introduction of firearms gradually led to the disuse of the lance in the west of Europe, though it continued among the Turks, the Albanians, Tartars, Cossacks, Poles, and Russians, and other Slavonic tribes. Napoleon organized several regiments of Polish lancers for service in his army, and now most of the armies of Europe have regiments of Uhlans or lancers.

Lancelet, a singular fish, 2 or 3 in. long, with a slender, compressed, transparent, lance-shaped body, occurring in shoal water in the temperate and torrid parts of the earth. No true or paired fins are represented, and in the other parts of its anatomy the low organization of the creature is readily appreciable. The vertebral axis consists of a slender rod pointed at each end, and composed of the softest of cartilage. There is no skull. The mouth is of oval shape, situated below and slightly behind the front part of the body, and there are no true jaws. It is surrounded by a ring of gristly matter, which supports small pieces of the same material; and these latter give origin to a number of delicate ciliated filaments or *cirri.* The mouth leads backward into a very large dilated chamber representing the expanded pharynx, which performs the part of a breathing organ; and the walls or sides of the pharynx are perforated by transverse clefts or fissures, while the inner lining of the chamber is plentifully provided with vibratile filaments or *cilia.* Breathing takes place by the admission of water through the mouth into the dilated pharynx, the effete water passing through the slits or clefts in the sides of the sac into the cavity of the abdomen, whence it escapes outwardly by an opening known as the "abdominal pore." The circulation of the blood, which is destitute of color, is performed by contractile dilatations situated upon the main blood-vessels, the heart being a simple expansion of the principal vein. The digestive system consists of a stomach and straight intestine. The animal has been pressed into the services of recent theories regarding the origin of living beings, as tending to illustrate how the higher and vertebrate groups of animals may have become developed from lower and invertebrate forms. Six species in all are known, one from Australia being regarded by some as a distinct genus.

Lancelot of the Lake, the name of one of the paladins celebrated in the traditions and fables relating to King Arthur and the Round Table. According to tradition, Lancelot was the son of Ban, king of Brucic, was educated by the fairy Viviana (the Lady of the Lake), and became one of the chief knights of Arthur's court. His love for Genevra or Guinevere, the beautiful wife of Arthur, and his disregard of Morgana, a fairy, and the sister of Arthur, placed the knight in the most dangerous and marvelous situations, from which, however, he always extricated himself by his valor and the Lady of the Lake. Lancelot is one of the chief figures in Tennyson's *Idylls.*

Lancet Window, a high and narrow window with an acutely arched top. Lancet windows are a marked characteristic of the early English style of Gothic architecture, and are in a great degree peculiar to England and Scotland. They are often double or triple, and sometimes five are placed together, as in the window called the "Five Sisters" at York.

Lancewood, the popular name of the wood of several trees of the order Anonaceæ, as of the *Oxandra virgăta,* a native of Jamaica, *Duguetia quitarensis,* a native of Cuba and Guiana, which possesses in a high degree the qualities of toughness and elasticity, and is on this account extremely well adapted for the shafts of light carriages, and all those uses where light, strong, but elastic timber is required.

Land Crabs, crabs so-called from their semi-terrestrial mode of life; their habits leading them to live on land, and away from the sea, even for considerable periods of time. The true land crabs occur in Asia particularly in Eastern Archipelago; in America, and specially in the West Indian Islands; and in Australia also. The best-known species is *G. ruricŏla,* found in the higher parts of Jamaica, which often proves very destructive to the sugar plantations. The crabs inhabiting the West Indian mangrove swamps and marshes appear to feed upon both vegetable and animal diet. Among other species of land crabs may be enumerated the sand crabs, the

beckoning or calling crabs, and the *Thelphusæ*, which inhabit fresh-water streams, but appear to be equally at home when on land.

Landgrave (German, *Landgraf*), in Germany, originally, about the twelfth century, the title of district or provincial governors deputed by the emperor, and given them to distinguish them from the inferior counts under their jurisdiction. Later, the title of three princes of the empire, whose territories—Thuringia, Lower and Higher Alsace—were called landgraviates.

Land League, an organization projected by Mr. Parnell, the leader of the Irish national movement, in 1879, the ostensible object of which was to purchase the land of Ireland for the people of Ireland. Funds were largely subscribed, especially in America, but the stringent rules against landlords and tenants holding aloof from it, and the alleged complicity of its members with many terrible outrages, caused it to be suppressed in 1881. After the suppression of the Land League a political and agrarian organization called the *National League* was formed. Its main objects are understood to be the reform of the land laws, the weakening of the power of the landlords, the increase of peasant proprietors, and the establishment of some kind of independent or semi-independent government for Ireland.

Landlord and Tenant.—The landlord in relation to a tenant is the person from whom lands or tenements are taken on lease, or by some other contract or agreement. The tenant is the person who holds lands or tenements of another by any kind of contract or agreement, usually for a periodical rent.

Landor, Frederick William (1821–1862), b. in Salem, Mass. He made two surveys for a railway to the Pacific Ocean. He constructed an overland wagon route across the continent. He served in the Civil War as a volunteer aide on the staff of General McClellan, and was afterward promoted to brigadier-general. He married the noted English actress, Jean Margaret Davenport.

Landor, Walter Savage (1775–1864), an English poet and prose writer. He was educated at Rugby and Oxford, from both of which he was expelled for unruliness. He published a small volume of poems in 1795, and a lengthy poem, *Gebir*, in 1798. His fame chiefly rests on his *Imaginary Conversations*, between celebrated persons of ancient and modern times: which is a model of a pure, vigorous, finished English style.

Landsberg, a town of Prussia, province of Brandenburg, and 37 mi. n.e. of Frankfurt. It has manufactures of engines and boilers, carriages, woolens, tobacco, spirits, etc. Pop. 24,893.

Landscape Gardening is the art of laying out grounds, arranging trees, shrubbery, etc., so as to bring into harmonious combination all the varied characteristics and surroundings. It disposes flowering plants, shrubs, and trees over varying levels in such a manner as to produce the most pleasing effects. it shuts out undesirable views by means of judicious planting, and introduces rock work, water and other artistic embellishments where the local peculiarities of the ground permit.

Landseer, Sir Edwin (1802–1873), a famous English painter. He began to draw animals when a mere child. He takes the very highest rank among animal painters. Among his best-known works are, *The Cat's Paw*, *The Return from Deer Stalking*, *High Life and Low Life*, *A Jack in Office*, *Highland Drover Departing from the South*, *The Return from Hawking*, *The Shepherd's Chief Mourner*, *There's Life in the Old Dog Yet*, *Defeat of Comus*, *The Stag at Bay*, *A Dialogue at Waterloo*, *Titania and Bottom*, *Swannery Invaded by Sea Eagles*.

Land's End, a headland in Cornwall, forming the southwestern extremity of England. There is a lighthouse on the rocks, called Longships, about a mile to the west.

Landshut (länts'höt), a picturesque old town of Bavaria, 38 mi. n.e. of Munich. It has many interesting buildings, among which are St. Martin's church, a fine Gothic structure built in 1407–77, the royal palace, the town-house, and the old castle of Trausnitz. Landshut has manufactures of leather, starch, machinery, carriages, tobacco, paper, etc. Pop. 17,873.

Landslide, the slipping or sliding of a considerable tract of land or earth from a higher to a lower level. Landslips are due to a variety of causes, chiefly the decay of supporting strata, or excessive saturation of the soil by rain. Among the more disastrous occurrences of this kind are the slip of the Rossberg Mountain behind the Rigi in Switzerland in 1806, burying villages and hamlets with over 800 inhabitants; and that at Naini Tal, a sanitary hill station in the Himalayas, in 1880, when 230 lives were lost.

Landsturm (länt'sturm), a local militia of Germany, which is never called from its own district but in case of actual invasion. It comprises that portion of the reserve too old for the *Landwehr*. Other European nations have a force of the same nature.

Landwehr (länt'vär), that portion of the military force of Germany and other European nations which in time of peace follow their ordinary occupations, excepting when called out for occasional training. The landwehr in some respects resembles a militia, with this important difference, that all the soldiers of the landwehr have served in the regular army. This system has received its fullest development in Germany, in which country it adds enormously, and at comparatively little cost, to the military power of the state.

Lang, Andrew, miscellaneous writer, b. at Selkirk 1844; educated at Edinburgh Academy, St. Andrew's University, and Baliol College, Oxford, where he took a distinguished position. A most versatile writer, he has published several volumes of ballads and other light verse; *Custom and Myth*, a valuable contribution to the science of comparative mythology; the article *Mythology* in the Encyclopædia Britannica; translations of Homer (with other collaborators) and of Theocritus, etc. He is a frequent contributor to the daily press

and to periodical literature, and edits *Longman's Magazine.*

Langensalza (lång'en-zål-tsä), a town of Prussia, in the province of Saxony, 18 mi. n.w. of Erfurt. It is a busy place, with cloth and other factories. Three battles have been fought in the vicinity, in 1761, 1813, and 1866, the Hanoverians being defeated by the Prussians in the last. Pop. 10,924.

Langlande (or Longland), WILLIAM (b. 1332), the supposed author of the English poem, *The Vision of William concerning Piers Plowman,* From internal evidence it is gathered that the poem in its earliest form was composed about 1362. Its rhythmical structure depends upon alliteration, which forms a substitute for rhyme. The poem is allegorical in form and satirical in spirit; the trials and troubles of life generally, but more particularly the corruptions of the church and the worldliness of the ecclesiastical order, are its theme. The *Crede of Piers Plowman* is an imitation of Langlande's work which appeared about the end of the fourteenth century. It is written by a follower of Wickliffe. These have all been published by the Early English Text Society under the editorship of Mr. Skeat. *Piers Plowman,* besides being of value for its pictures of old English life, is of very great importance for the study of English in its earlier forms.

Langley, SAMUEL PIERPONT (1834–), astronomer and physicist, b. in Roxbury, Mass., educated at Boston Latin School. In 1865 was made assistant in the Harvard Observatory and soon after became professor of mathematics in the U. S. Naval Academy at Annapolis. He went to various places under the auspices of the government to observe eclipses and became an authority on solar phenomena. In 1887 he was made secretary of the Southern Institution. Among his works may be mentioned *The New Astronomy, Experiments in Ærodynamics* and the *Internal Work of the Wind.* He has experimented largely with flying machines.

Langton, STEPHEN (1150–1228), English cardinal, and archbishop of Canterbury in the reign of John. In 1206 Innocent III created Langton a cardinal and nominated him to the see of Canterbury, consecrating him archbishop next year. King John refused to accept him, and it was after England had been placed under an interdict and John excommunicated and threatened with deposition that he yielded. Langton was acknowledged in July, 1213, and in August he joined the insurgent barons, and acted with them in compelling John to sign Magna Charta. He crowned Henry III, and in 1223 he demanded of him the full execution of the charter. He was the author of some theological treatises.

Languedoc (lân-gê-dok), one of the old provinces of Southern France, now forming the departments of Aude, Tarn, Hérault, Lozère, Ardèche, and Gard, as well as the arrondissements of Toulouse and Villefranche, in the department of Haute-Garonne; and the arrondissements of Puy and Yssingeaux, in the department of Haute-Loire.

Lanier, SYDNEY (1842–1881), poet and musician, born at Macon, Georgia; a graduate of Oglethorpe College, where he taught one year, then entered the Confederate army. He served through the war, suffering so from exposure and imprisonment, that he was an invalid the rest of his life. After the war, he supported himself by teaching, then by clerking in a shop, but devoted all his spare time to music and literature. Then, he went to Baltimore and obtained a position as first flute in the Peabody Symphony Orchestra. In Baltimore his literary, as well as his musical ability, was everywhere recognized. In 1876, he was chosen to write the *Cantata* for the Centennial Exposition. In 1879, he was made a lecturer on English Literature at Johns Hopkins University, where he delivered lectures afterward published as *The Science of English Verse* and *The English Novel.* Lanier believed that all expression in words is essentially musical; the difference between speech and what is usually called music, being that speech has far greater variety of tone. His poems are remarkable for their elaborate and beautiful study of tone and are distinctly American in thought. He was one of the greatest poets of his generation and is gaining steadily in fame. Among his best known poems are *Corn, The Marshes of Glynn* and *The Song of The Chattahoochee.*

Lansing, Ingham co., Michigan, the state capital, on both sides of the Grand river and at the mouth of the Cedar river, 88 m. n.e. of Detroit. Railroads: Grand Trunk, L. S. & M. S., Mich. Cent. and Perè Marquette. It is in the center of an excellent farming region, has an elevated location and derives good water power from the rivers, which are here crossed by ten bridges. The city has important manufactures, chief of which are gas and gasoline engines, cream separators, agricultural implements, sleds, stoves, flour, knit goods and machinery. The state capitol covers four city blocks and cost $1,500,000. The city has also a city hall and a post-office building, each costing about $150,000. In or near Lansing are the State Industrial School for Boys, the State School for the Blind and the State Agricultural College. Lansing owns its water works and electric light plant, has an electric street railway, a state bank, a number of newspapers, good public schools and numerous churches and hotels. Pop. 1900, 16,485.

Lansingburgh, Rensselaer co., N. Y., on the Hudson River, a suburb of Troy. Railroad, Fitchburg. It has brush and oil cloth manufactories and collar, cuff, shirt and carriage factories. Pop. 1900, 12,595.

Lantern Flies, insects allied to the cicadas, but forming a family by themselves. The lantern fly proper is a native of South America. It is more than 3 inches in length, and 5 across the wings. It has been asserted that it emits a strong light from the inflated expansion of the forehead, but the evidence of this luminosity is more than doubtful. They are in fact reported to fly only during sunlight and not to appear abroad during dark.

of its song. The wood lark is less common than the skylark, and is known by its smaller size and less distinct colors. It perches upon trees, and is found chiefly in fields near the borders

Lark.

of woods. It sings during the night, and on this account has been mistaken for the nightingale.

Larkspur (sometimes called Lark's-heel), a genus of plants of the order Ranunculaceæ, distinguished by its petaloid calyx, the superior sepal of which terminates in a long spur. The upright larkspur and the branching larkspur are well-known garden flowers.

La Rochefoucauld (rōsh-fō-kō), François, duc de, Prince de Marsillac (1613–1680), a distinguished courtier and man of letters under Louis XIV, was b. at Paris. As a distinguished military officer he appeared at the court of Louis XIII, but being suspected by Richelieu of favoring the party of Queen Anne of Austria he was exiled to Blois. His *Mémoires*, published in 1662, and his *Réflexions ou Sentences et Maximes Morales*, published anonymously in 1665, were the fruits of his literary activity. The latter work, for its brilliancy of style, is still considered a French classic.

Larva, the term applied in natural history to the first stage in the metamorphosis of insects, and certain other of the lower invertebrates. In insects it is equivalent to the grub or caterpillar stage. Many of the crustacea, as crabs and barnacles, and even vertebrata, as in frogs and newts, pass through larval forms. The larval crab was for long described as a distinct crustacean with the name *Zoëa*.

Laryn'goscope, a contrivance for examining the larynx and commencement of the trachea. It consists of a plane mirror introduced into the mouth, and placed at such an angle that the light thrown on it from a concave reflector, in the center of which is an aperture, is made to illuminate the larynx, the image of which is again reflected through the aperture in the reflector to the eye of the observer.

Larynx, the organ by which the voice is produced, situated at the upper part of the trachea or windpipe. The larynx is formed mainly of two pieces of cartilage, called the *thyroid* and the *cricoid*, one placed above the other. The thyroid is formed of two extended wings meeting at the middle line in front in a ridge; above and from the sides two horns project upward, which are connected by bands to the hyoid bone, from which the larynx is suspended. The thyroid cartilage rests and is movable upon the cricoid, moving backward or forward, but not from side to side. The cricoid cartilage is shaped like a signet ring (Greek *krikos*, a ring), the narrow part of the ring being in front. The cricoid carries, perched on its upper edge behind, the *arytenoid* cartilages, which are of great importance in the production of the voice. These various cartilages form a framework upon which muscles and mucous membranes are disposed. The mucous membrane which lines the larynx is thrown into various folds. These folds are called the *true* vocal cords, and by their movements the voice is produced. They are called *true*, as distinct from the *false* vocal cords which are above them, but take no part in producing the voice. The true vocal cords projecting toward the middle form a chink, which is called the *glottis*. By the contraction of various muscles this chink can be so brought together that the air forced through it throws the edges of the membrane into vibration and so produces sounds. Variations in the form of the chink will effect changes in the sound. Thus the production of voice is the same as in musical instruments, the arrangements in the larynx being such as, 1, to produce the vibratory sounds, 2, to regulate the sound, 3, to vary the pitch, and 4, to determine the quality of the sound. The rapid, delicate, muscular movements involved are produced by nervous stimuli reaching the muscles from the brain. Thus the voice is produced in the larynx, and is modified by the rest of the respiratory passages. In the act of swallowing, the glottis is covered by a cartilaginous plate called the *epiglottis*.

La Salle, Robert Cavelier (1643–1689), a French explorer. He went to Canada early in 1666. In 1669 he descended the Ohio to where Louisville now stands. He led exploring expeditions in the regions of the great lakes and along the Mississippi, and was appointed commandant by the French government of all the country from Fort St. Louis, in what is now the state of Illinois, to New Biscay.

La Salle, La Salle co., Ill., on the Illinois River, at head of navigation and terminus of Michigan Canal. Railroads: Illinois Central; C. R. I. & P.; and C. B. & Q. Industries: zinc, sulphuric acid and bottle works, cement works, large brewery, etc. Coal mines yielding 1,000 tons per day near here. Building stone is quarried. Has a large shipping trade. Pop. 1900, 10,446.

Lascar, the name applied by Europeans to native East Indian sailors, many of whom are now employed in the mercantile marine.

Las Casas, Bartolome de (1474–1556), a Spanish prelate, known as the Apostle of the Indians. He accompanied Columbus to Hispaniola in 1498, and on the conquest of Cuba received charge as priest there, and distin-

guished himself for his humane treatment of the natives. In the cause of religion he visited various parts of the New World, including Mexico, Guatemala, Peru, etc. In 1542 he wrote his famous *Brevissima Relacion de la Destruccion de las Indias.* His untiring labors were productive of good to the natives, yet it is a singular fact that he proposed to purchase negroes in order to supply the Cuban planters with African laborers instead of the Indians. He was made bishop of Chiapas in 1544, but resigned this dignity in 1547, his humane efforts being frustrated.

Las Casas (lås'cäs), EMMANUEL AUGUSTE DIEUDONNÉ MARIN JOSEPH, COMTE DE (1766–1842), French writer. Employed before the revolution as a lieutenant of marines, he afterward retired to England, where he supported himself by private teaching. Returning to France, he employed himself upon his *Atlas Historique,* published under the name of Le Sage. Coming under the notice of Napoleon, he was by him made baron and minister of state. After Waterloo he shared Napoleon's imprisonment in St. Helena, where the emperor dictated part of his *Memoirs* to Las Cases, and took lessons from him in English. Removed to the Cape of Good Hope from St. Helena for sending out a secret letter, he was permitted to return to France after Napoleon's death, where he published the *Mémorial de St. Hélène* in his *Atlas Historique.*

Lassa (or Lhassa), the capital of Thibet, situated on the Kitchu, a tributary of the Brahmaputra. All the public edifices worthy of notice are connected with the Buddhist religion, Lassa being the great center of Buddhism, and being greatly resorted to from China, Turkestan, Nepaul, etc., as a school of philosophy and Buddhism. Lassa is the principal emporium of Thibet; silk stuffs, tea, and other articles being here exchanged for Thibetan, Indian, and European goods. Pop. of city and suburbs est. at 50,000.

Lassalle (lås'sål-lè), FERDINAND (1825–1864), a notable German socialist; studied at Berlin University; first made himself known as a leader during the democratic troubles of 1848, and was imprisoned for a year. In 1861 he published his *System of Acquired Rights.* Thereafter he proceeded to organize the working classes, which caused the government to accuse him of sedition, and he was imprisoned for four months. In May, 1863, he founded a labor union, and began that socialist propaganda which has since become so widespread in Germany. In the summer of 1864 he sought rest in Switzerland, and was there killed in a duel. His best known treatise is the famous *Programme for the Working Classes.*

Lasso, a contrivance used in Spanish America, consisting of a long rope of plaited rawhide, at one end of which is a small metal ring. By means of this ring a noose is readily formed, and the lasso, or lariat, is then used for catching wild cattle, the rope being cast over the animal's head or leg while the hunter is in full gallop.

Lat, a name given to pillars common to all the styles of Indian architecture. With the Buddhists they bore inscriptions on their shafts, with emblems or animals on their capitals. They are among the most original and often the most elegant productions of ancient Indian architecture.

Lateen' Sail is a triangular sail used in xebecs, feluccas, etc., in the Mediterranean, and in the dahabiehs of the Nile. It is extended by a *lateen* yard, which is slung across a mast so as to make an angle of about 42 degrees with it, the lower portion of the yard being about a third of the whole.

Latent Heat, that portion of heat which exists in any body without producing any effect upon another or upon the thermometer; termed also *insensible* as distinct from *sensible* heat. It becomes sensible during the conversion of vapors into liquids, and of liquids into solids; and on the other hand a portion of sensible heat disappears or becomes *latent* when a body changes its form from the solid to the liquid, or from the liquid to the gaseous state.

Lat'eran, one of the churches at Rome, built originally by Constantine the Great, and dedicated to St. John of Lateran. It is the episcopal church of the pope, and the principal church of Rome. It has a palace and other buildings annexed to it. Every newly-elected pope takes solemn possession of the church, and from its balcony the pope bestows his blessing on the people. The site on which the buildings of the Lateran stand originally belonged to Plautius *Lateranus,* who was put to death by Nero; hence the name.

Lathe, a machine for turning and polishing flat, round, cylindrical, oval, and every intermediate form of body in wood, ivory, metals, etc., the object worked on receiving a rotary motion; it is also used in glass cutting and earthenware manufacture. It may be turned by the hand, the foot, steam power, water, etc. A *duplex lathe* is one which works on two turning tools at once; *Blanchard's lathe* is one for turning objects of an irregular form, as lasts, gun stocks, etc. A *throw lathe* is one in which the mechanic drives the lathe with one hand, holding the cutting tool with the other. The term is also applied to the batten or lay of a loom in which the reed is fixed, and by the movements of which the weft threads are laid parallel to each other, shot after shot, in the process of weaving.

Lat'imer, HUGH (1490–1555), an English prelate, reformer, and martyr. He entered Cambridge University about 1505, and became M. A. in 1514. He was made chaplain to Henry VIII in 1530, and during the ascendency of Anne Boleyn in 1535 he was appointed bishop of Worcester. In 1538 he resigned his bishopric, not being able to accept the Six Articles, and was put in prison, but on the accession of Edward VI he was released and became highly popular at court. This continued until Mary ascended the throne, when Latimer was cited to appear, along with Cranmer and Ridley, before a council at Oxford, and condemned. After much delay and a second trial, Latimer and Ridley were burned at the stake, Oct. 16,

1555. His preaching was popular in his own time for its pith, simplicity, and quaintness.

Latins (*Latini*), the ancient inhabitants of Latium, in Italy. In very early times the Latins formed a league of thirty cities, of which the town of Alba Longa, said to have been built by Ascanius, the son of Æneas, became the head. Rome was originally a colony of Alba, and thus the language of the Romans is known as the Latin language.

Lat'itude, in geography, the distance of any place on the globe north or south of the equator measured on its meridian. It is called *north* or *south* according as the place is on the north or south of the equator. The highest or greatest latitude is 90°, that is, at the poles; the lowest or smallest 0°, at the equator, between which and the poles any number of parallel circles called *parallels of latitude* may be supposed to be drawn. One method of finding the latitude of a place is by measuring the altitude of the polar star. When the latitude and longitude of a place are given its position on a map is easily found.

La'tium, the ancient name applied to a district of central Italy on the Tyrrhenian Sea, extending between Etruria and Campania, and inhabited by the Latins, Volsci, Æqui, etc.

Lato'na (by the Greeks called *Lētō*), in Greek mythology, the mother of Apollo and Artemis. Latona is represented as a mild, benevolent goddess, in a sea-green dress. She was worshiped chiefly in Lycia, Delos, Athens, and other cities of Greece.

Latour D'Auvergne (là-tör dō-verny), Theophile Malo de (1743–1800), French soldier. Entering the military service in 1767, he became aide-de-camp to the Duke of Crillon, and distinguished himself at the siege of Mahon. When the revolution began he was a captain of grenadiers, refused higher positions, and was named *First Grenadier of France* by Napoleon. He commanded a corps of 8,000 men, which was known as the *infernal column.* In 1799 he fought under Masséna in Switzerland, and fell at Neuburg, June 27, 1800.

Lattice Leaf (Lattice plant), a very remarkable aquatic plant of Madagascar, noteworthy for the structure of its leaves. The blade resembles lattice work or open needlework, the longitudinal ribs being crossed by tendrils, and the interstices between the open.

Laud, William (1573–1644), Archbishop of Canterbury in the reign of Charles I, was b. at Reading in Berkshire. He was educated at St. John's College, Oxford; took priest's orders in 1601; was made chaplain to Neile, bishop of Rochester, in 1608; became president of his college and king's chaplain, and in 1617 accompanied James I to Scotland, where he attempted to enforce Episcopacy with no success. In 1630 he was elected chancellor of the University of Oxford, which he enriched with a valuable collection of manuscripts, establishing also a professorship of Arabic. In 1633 he was promoted to the see of Canterbury. In 1634 he instituted rigorous proceedings against all who would not conform to the Church of England. By means of spies he hunted out the Puritans, and sought to extinguish all forms of dissent by means of fines, imprisonment, and exile. He prosecuted Prynne, Burton, and Bastwick for libel, and to him is attributed the severe sentences which they received. When the Long Parliament met (1640) the archbishop was impeached for high treason at the bar of the House of Lords by Denzil Holles and committed to the Tower. After three years he was brought to trial, but the lords deferred giving judgment. The House of Commons, however, passed a bill of attainder (January, 1644), declared him guilty of high treason, and condemned him to death.

Lau'danum, tincture of opium. See *Opium.*

Laughing Gas, nitrous oxide, or nitrogen monoxide, or protoxide of nitrogen: so called because, when inhaled, it usually produces exhilaration. See *Nitrogen.*

Laughing Jackass (or Giant Kingfisher), a bird allied to the kingfisher, deriving its former title from the singularly strange character of its cry. It is an inhabitant of Australia, being found chiefly in the southeastern portion of that country. It makes no nest, but deposits its eggs in the decayed hollow of a gum tree. In length about 18 in., it has a dark brown crest, its back and upper surface is olive-brown, wings brown-black, and the breast and under portions white, crossed by faint bars of pale brown. The tail is longish, with a rounded extremity, tipped with white; its color is a rich chestnut, with deep black bars.

Laughter, the outward expression of a certain emotion or excited condition of the nervous system, manifested chiefly in certain convulsive and partly involuntary actions of the muscles of respiration, by means of which the air, being expelled from the chest in a series of jerks, produces a succession of short, abrupt sounds; certain movements of the muscles of the face, and often of other parts of the body also taking place. Laughter is generally excited by things which are of a ridiculous or ludicrous nature, the ultimate cause being usually attributed to the perception of some incongruity, though mere incongruity is not always sufficient. It may also be caused, especially in the young, by tickling; it also accompanies hysteria, and sometimes extreme grief.

Launceston, the second town of Tasmania, by rail 120 mi. n. of Hobart, at the confluence of the North and South Esk rivers with the Tamar, which is navigable up to the town from the sea at Fort Dalrymple, a distance of 40 mi. Among the buildings are a government house, town hall, military barracks, jail, and courthouse. There are also public schools, banks, post office, and several newspaper establishments. Pop. 19,353.

Lau'reate, Poet, a designation first applied to poets who were honored by the gift of a laurel wreath. It is now the name of an official connected with the royal household of Great Britain, the patent for which appears to have been granted by Charles I, 1630, although Ben Jonson and others are said to have held the title previously. It was the chief duty of the

laureate to furnish an ode on the birthday of the king or upon the occasion of a national victory, the emolument attached to the office being $500 a year with a tierce of canary. Since the reign of George III, there have been no special duties connected with the office. From the time of Charles II the following poets have in succession held the office of laureate: John Dryden, Nahum Tate, Nicholas Rowe, Lawrence Eusden, Colley Cibber, William Whitehead, Thomas Warton, Henry James Pye, Robert Southey, William Wordsworth, Alfred (Lord) Tennyson, and Alfred Austin.

Laurel, a plant belonging to the genus *Laurus*, nat. order Lauraceæ, to which it gives the name. The sweet bay or laurel is a native of the north of Africa, and south of Europe, and is cultivated in gardens not only on account of its elegant appearance, but also for the aromatic fragrance of its evergreen leaves. The fruit, which is of a purple color, and also the leaves, have long been used in medicine as stimulants and carminatives. The common or cherry laurel, the Portugal laurel, the spurge laurel, are very different from the true laurel. The name is also given to other plants, as in America to the *Rhododendron maximum*. In ancient times heroes and scholars were crowned with wreaths of bay leaves, whence the terms *laurels* in sense of honors (and similarly *bays*), and *laureate*. From the fruit of the sweet-bay or laurel, several oily substances have been extracted. Thus there is the *oil of laurel*, a yellowish oil with an odor of laurel, and a strong, bitter taste; *laurel fat*, a yellowish-green, buttery substance, used for embrocations in rheumatism, paralysis, deafness, etc. The cherry laurel also yields a volatile, poisonous oil when its leaves are distilled in water. Notwithstanding this cherry laurel leaves are often employed in cookery, for their flavoring qualities. But caution requires to be exercised in their use, as death has resulted from an over supply in custards, puddings, etc., and it is better to use bay leaves instead. From the cherry laurel *laurel water* is produced from the leaves by distillation.

Laurel-water, a fluid obtained by maceration and distillation from the leaves of the cherry laurel, being a watery solution of the volatile oil contained in the plant. It contains prussic acid and is therefore poisonous, but is used medicinally.

Laurentian Mountains, a range in Canada extending for over 3,000 mi. from Labrador to the Arctic Ocean, forming the watershed between Hudson's Bay, the St. Lawrence, and the Great Lakes, and dividing the same bay from the sources of the Mackenzie River. The average elevation is about 1,500 ft., while some of the peaks attain a height of 4,000 ft. The rock formation belongs to the fundamental metamorphosed sedimentary deposits known as the Laurentian system (see above), and the name was given by Sir William Logan.

Laurier, Sir Wilfred (1841——), a Canadian statesman; b. at St. Lin, Quebec, Nov. 20, 1841. He was educated at L'Assomption College, and was admitted to the bar in 1865. For a short time he was editor of *La Defricheur*, then became member of the Quebec Assembly. In 1874 he was elected to the Dominion Parliament, and became minister of internal revenue in 1877. He is an eloquent speaker, and on the retirement of Mr. Blake became leader of the Liberal party in 1887. In 1896 he was chosen premier of the Dominion, being the first French Canadian to hold the office. In 1898 he was appointed a member of the Anglo-American Joint High Commission to adjust the difficult questions existing between the United States and Canada. Pl. 10, Vol. I.

Lausanne (lō-sånn), a town in Switzerland, capital of the canton of Vaud, on the slopes of Mount Jorat, about ½ mi. from the Lake of Geneva and 31 mi. n.e. of the town of Geneva. Lausanne is built on three hills, two of which are connected by a lofty viaduct, and the most interesting building is the Gothic cathedral, founded about A.D. 1000. Lausanne has little trade or manufactures, but it is much visited by tourists, and its educational institutions attract many foreign pupils. In 1875 it became the seat of the supreme court of the republic. Pop. 33,340.

Lava, the general term for all rock matter that flows, or has flowed, in a molten state from volcanoes, and which when cooled down forms varieties of tufa, trachyte, trachytic greenstone, and basalt, according to the varying proportions of feldspar, hornblende, augite, etc., which enter into the composition of the mass, according to the slowness or rapidity with which it has cooled. The more rapidly this process of cooling goes on the more compact is the rock. *Lava beds* are of two kinds, namely, *contemporaneous* and *intrusive*. A *contemporaneous lava bed* is one which has been poured out over the surface of one deposit, and covered by subsequent deposits. Such a bed is in its natural position, and usually alters only the bed beneath it. *Intrusive beds* are those which have been forced up in a molten state through or between strata, altering those on both sides.

Laval, a town of France, capital of the department, 154 mi. w. s. w. of Paris. It is an interesting and picturesquely situated place; and among its principal edifices are Trinity church (now the cathedral), the church of the Cordeliers, and an ancient castle, now a prison. The manufactures consist of damasks and other linen goods, flannels, etc. Pop. 30,374.

Lava'ter, Johann Casper (1741–1801), celebrated as a physiognomist, was b. at Zurich in Switzerland. He is best known as the originator of a system by means of which, when applied to the lines and contours of the face, he claimed to be able to read the character of its owner. He adopted the idea in 1769, and published his great work under the title of *Physiognomical Fragments*.

Laveleye (låv-lā), Emile de (1822–1892), a well known Belgian economist, educated at Bruges and Paris; published his first work in 1847, and became professor of economics at the

University of Liége in 1864. He has published many works on the science of economics, of which we may mention *Etude d' Economie Rurale* (1864), *Eléments de' Economie Politique* (1882), and *Le Socialisme Contemporain.*

Lav'ender, a delightfully fragrant shrub three to four feet high, a native of the south of Europe. Under favorable conditions it contains one fourth of its own weight in camphor. It also produces a volatile oil, which is much in demand as an excellent perfume. This oil is got by distilling the flowers. It has a pale yellow color, aromatic odor, and a hot taste. Besides being employed as a perfume, it is used in medicine as a stimulant in hysteria, colic, and other affections. *Spirit of Lavender* is prepared by digesting the fresh flowers in rectified spirits and distilling. *Lavender water* is a solution of oil of lavender in spirit along with otto of roses, bergamot, musk, cloves, rosemary, etc. This preparation after standing for some time is strained and mixed with a certain proportion of distilled water. Enough oil is produced annually in England to make 30,000 gallons of lavender water. Florida water, a favorite American perfume, is largely prepared from lavender.

Laver, a name given to two species of algæ of the genus *Porphyra—P. laciniata* and *P. vulgaris.* They are employed as food, salted, eaten with pepper, vinegar, and oil; and are said to be useful in scrofulous affections and glandular tumors. *Green laver* is the *Ulva latissima.* It also is employed as food, stewed and seasoned with lemon juice, and is ordered for scrofulous patients.

Lavoisier (lä-vwä-si-ā), ANTOINE LAURENT (1743–1794), a celebrated French chemist. The son of wealthy parents, he was educated at the Collége Mazarin, Paris, studied mathematics and astronomy under Lacaille, worked in the laboratory of Rouelle, and received lessons on botany from Bernard de Jussieu. His first public distinction was to receive the prize for the best essay on lighting the streets of Paris (1766). About this period he published several treatises, traveled through France collecting material for a geological chart, became an associate of the Academy in 1768, and obtained the post of farmer-general of taxes in 1769. He was the first to organize the methods of chemistry and establish its terminology. Accused before the Convention as an ex-farmer-general, he was guillotined in the reign of terror.

Law, GEORGE (1806–1881), American financier, was b. in Jackson, N. Y. Learning the trades of mason and stonecutter he became a contractor for the construction of railroads and canals; afterward owning a line of steamships to California and Panama, and engaging in other large enterprises, including Panama R. R.

Law, JOHN (1671–1729), of Lauriston, a celebrated financial projector, son of a goldsmith of Edinburgh. He was bred to no profession, but being skilled in accounts he made various proposals to the Scottish Parliament to remedy the currency, which were rejected. Subsequently he fled from his country in consequence of a duel; visited Genoa and Venice, where he accumulated a fortune by gambling; settled in France, where he received royal patronage, and there started a private bank, and floated his celebrated Mississippi Company. His immediate success was so great that he was made a councillor of state and comptroller general, but the large amount of paper money issued depreciated the shares, and led to the collapse of his schemes. Having had to flee from France, he wandered about Europe as a gambler, and died at Venice in poverty.

Lawn Tennis is a modified development of an old English game, and is played with rackets and india rubber balls. The players number two or four, forming even sides. The ground on which the game is played is usually 78 ft. long by 30 ft. broad. This space is divided by a net 24 ft. wide, 5 ft. high at the ends, and 4 ft. in the center; the extreme ends of the area are called *the base lines.* The space on either side of the net thus marked off is called a *court.* This court has two lines running through it, one of which is called the *central line,* and runs lengthwise; the other is known as the *service line,* and runs parallel to, and 30 ft. distant from, the central net. The ground thus divided is called the right and left courts. The mode of playing with two is, that one is called the server or "hand-in," while the other is "hand-out." When the ball is served by "hand-in" the server must stand with one foot outside the *base line* of the court, beginning on the right side, and his aim is to pitch the ball across the net and into the court diagonally opposed. If the server fails to do this it is called "a fault," and he must serve again. When the ball is properly served it is the opponent's duty to return it across the net before it touches the ground a second time. Should the ball not be returned, "hand-in" scores a point; on the contrary, should the ball not be properly served, "hand-out" scores. The player who first scores fifteen wins the game, but if both players are equal at fourteen the score is called "deuce." It is here that "vantage" is introduced, and in order to score game the player must win two successive points; otherwise the score returns to "deuce."

Lawrence, Douglas co., Kan., on Kansas River, 29 mi. s. e. of Topeka. Railroads: Union Pacific; A. T. & S. F.; and K. C. W. & N. W. Industries: paper, flour, and canning mills, carriage, barbed wire, chemical, iron, brass, and other works. It is the seat of the University of Kansas, and the Haskell Institute for the Instruction of Indians. Pop. 1900, 10,862.

Lawrence, Essex co., Mass., on the Merrimac River, 26 mi. n. w. of Boston. Railroad, Boston & Maine. Industries: large woolen and worsted mills, also large paper mills, foundries, and machine shops. Some of the largest cotton mills in the country are located here, the Pacific mills employing 6,000 hands. It has immense water power. Pop. 1900, 62,559

Lawrence, ST., one of the largest rivers in the world, which rises under the name of the

St. Louis, and drains the great chain of North American lakes. In different parts of its course it is known by different names. From the sea to Lake Ontario it is called *St. Lawrence;* between lakes Ontario and Erie it is called *Niagara River;* between lakes Erie and St. Clair, *Detroit River;* between lakes St. Clair and Huron, *St. Clair's River;* between lakes Huron and Superior, *St. Mary's River* or the *Narrows*, forming thus an uninterrupted waterway of upward of 2,000 mi. It receives the Ottawa, its principal auxiliary, at Montreal, as also the St. Maurice, the Saguenay, and numerous other large rivers from the north. The river is navigable for Atlantic steamers to the city of Montreal, 600 mi. up, and from Montreal upward by river and lake steamers. The rapids between Montreal and Lake Ontario are passed by means of canals, and Niagara Falls by the Welland Canal. The river's breadth between Montreal and Quebec is from ½ mi. to 4 mi.; the average breadth, about 2 mi. Below Quebec it gradually widens till it enters the Gulf of St. Lawrence. See next art. From the beginning of December to the middle of April the navigation is totally suspended by ice. In part of its course it forms the boundary between the U. S. and Canada.

Lawrence, St., Gulf of, a large inlet of the North Atlantic in British North America forming the continuation of the estuary of the river St. Lawrence, and separated from the Atlantic chiefly by the island of Newfoundland, Cape Breton, and Nova Scotia. It communicates with the ocean by the opening between Newfoundland and Cape Breton, about 65 mi. wide, by the Strait of Belle Isle and the Gut of Canso. It contains numerous islands.

Lawrence, Amos (1786–1852), American merchant, was b. in Groton, Mass. In partnership with his brother Abbott a very large business was established, including manufactures. In 1831 Amos retired, and engaged in acts of beneficence, expending $640,000 for charitable purposes. His brother, Abbott (1792–1855), American merchant was b. in Groton, Mass. In 1834 he was elected to Congress. In 1848 was candidate for vice-president. In 1849 minister to Great Britain.

Lawrence, James (1781–1813), was b. at Burlington, N. J. In 1798 he entered the U. S. navy as midshipman. He served under Commodore Bainbridge, and as commander of the *Peacock* captured the *Hornet.* In 1813 he was commander of the *Chesapeake*, and in a battle with the British ship *Shannon* his ship was captured, and he was killed.

Lawrence, John Laird Mair, Lord (1811–1879), governor general of India. Educated at the college of Haileybury, he went to India in 1829, where his rare administrative ability attracted attention, and caused him to receive the appointment of chief commissioner of the Punjab in 1853, after he had served in minor posts. The entire wisdom of this appointment was demonstrated during the Indian mutiny of 1857. By the influence which he had gained over the Sikhs, Lawrence was able not only to keep the Punjab quiet, but to collect native forces and send them to assist in the early capture of Delhi. He was known as the savior of India, and his services were rewarded by his being made governor general in 1863. On his return to England in 1868 he was raised to the peerage under the title of Baron Lawrence of the Punjab and of Grately.

Lawrence, Sir Thomas (1769–1830), English painter, was b. at Bristol. He was the son of an innkeeper, and at an early age gave striking proof of his talent for art, being employed as a painter of portraits in crayons. When his family removed to London in 1787, he became a student of the Royal Academy; was elected an associate by desire of the king; became a Royal Academician in 1798, and was knighted by the prince regent in 1815. He painted portraits of many of the most notable persons of his time. He was the favorite portrait painter at the English court, and was also employed at Vienna.

Lawton, General Henry W. (1843–1899), an American soldier; b. at Manhattan, O., Mar. 17, 1843. He entered the Union army in 1861, and served during the Civil War. In 1866 he was commissioned second lieutenant in the regular army. In 1886 he was made Inspector General with the rank of major. At the beginning of the Spanish War he was promoted to the rank of brigadier-general of volunteers and commanded the division that captured El Caney, July 1, 1898. The next year General Lawton was sent to the Philippines as second in command, and rendered valuable service in putting down the Filipino rebellion. He was killed in an attack on San Mateo, Dec. 19, 1899.

Lay'ard, Sir Austin Henry (1817–1894), English traveler, archæologist, and diplomatist, was born of a family originally French, and was partly educated in Italy. In 1839 and following years he traveled in the East, and in 1845 began his celebrated excavations on the site of ancient Nineveh, publishing the results of his discoveries in 1849–53. He was appointed attaché to the British embassy at Constantinople in 1849. In 1852 he entered Parliament in the Liberal interest; became under-secretary for foreign affairs in 1860, commissioner of works in 1869, and ambassador to the Porte in 1877 under Lord Beaconsfield's government, when he accomplished the annexation of Cypress. He is best known by his books, *Nineveh and its Remains* and *Discoveries in the Ruins of Nineveh and Babylon.*

Lazzaro'ni, a class of persons in Naples without employment or home, and having no settled means of support. The name is said to be derived from that of Lazarus in the parable, though it is more directly connected with the hospital of St. Lazarus, which served as a refuge for the destitute of the city. For a long time they played an important part in all Neapolitan revolutions, and under Masaniello accomplished the revolt of July 7, 1647, against the Duke d'Arcos. They are now no longer a separate class, though the name is still applied to the boatmen and fishermen of the city.

Lead, a metal of a bluish-gray color; when

newly cut it has a strong metallic luster, but soon tarnishes by exposure to the air, owing to the formation of a coating of carbonate of lead. It is soft, flexible, and inelastic. It is both malleable and ductile possessing the former quality to a considerable extent, but in tenacity it is inferior to all ductile metals. It fuses at about 612°, and when slowly cooled forms octohedral crystals. It is an abundant and widely distributed metal. It is a constituent of a very large number of minerals, all of which could be used as sources of it if they could be obtained in sufficient quantity. In practise the metal is obtained from only a few of these minerals, especially from the sulphide, carbonate, and one or two others. The most important of all the ores of lead is the *sulphide* or *lead glance*, which has been described under the term *galena*. The *carbonate*, also called *cerusite*, or *lead spar*, like all the salts of lead, is perfectly unmetallic in its appearance, and is not unfrequently rejected from among common lead ore as an earthy mineral. It occurs in veins in primitive and secondary rocks, accompanying galena and other ores of lead. *The sulphate of lead, anglesite, or lead vitriol*, was found originally at Anglesey. *Chromate of lead, crocoisite*, or *crocoite* was originally found in Siberia; it has since been met with in the Philippine Islands, in Brazil, and in Hungary. It was in this mineral that *chromium* was first discovered. *Phosphate of lead* is found accompanying the common ores of lead, though rarely in any considerable quantity, In the ores of lead silver is a very common constituent. There are four oxides of lead: 1, The suboxide, of a grayish-blue color. 2, The protoxide or yellow oxide, called also *massicot*. *Litharge* is this oxide in the form of small spangles, from having undergone fusion. 3, The red oxide, the well-known pigment called *red lead* or *minium*. 4, The dioxide or brown oxide, obtained by putting red lead in chlorine water or in dilute nitric acid. Carbonate of lead is the basis of white oil paint and a number of other colors. The salts of lead are poisonous, but the carbonate is by far the most virulent poison. Lead is one of the most easily reducible metals, and from the native carbonate can be obtained by simply heating with coal or charcoal. The sulphide, however, which is the most abundant of its ores, is not so readily acted on by coal, and a reverberatory furnace, or a special variety of blast furnace, is employed. Lead obtained in this way is usually too hard for use, and it has to be subjected to a process of purification. This is effected by roasting the lead, sometimes for several weeks, in a reverberatory furnace. By this process the antimony, which is the chief impurity, is burned off, and the dross, which consists of the oxide of that metal with oxide of lead, is afterward reduced and utilized as a source of antimony. The lead, when judged sufficiently pure, is then cast into ingots or pigs of lead. Prepared in this way the lead retains all the silver present in the original ore, and as that is always of value it used to be extracted whenever the quantity of silver present amounted to above 10 oz. per ton. 1 part of tin and 2 of lead form an alloy fusible at 350° F., which is used by tinmen under the name of *soft solder*. Lead also forms an imperfect alloy with copper. With antimony lead forms the important alloy called *type metal*. Pewter is a hard alloy of four parts of tin and one of lead. In these proportions the lead is not attacked by organic acids such as the acetic. For the poisonous effects of lead see *Lead Poisoning*.

Lead, an instrument used on shipboard for discovering the depth of water. It is composed of a large piece of lead shaped like an elongated clock weight, from 7 to 11 lbs. in weight, and is attached to a line, generally of 20 fathoms length, called the *lead line*, which is marked at certain distances to ascertain the depth in fathoms. When the depth is great the *deep-sea lead*, weighing from 25 to 30 lbs., is used. The line, which is much longer than the former, and called the *deep-sea line*, is marked by knots every 10 fathoms, and by a smaller knot every 5.

Lead-poisoning, a disease caused by the presence of lead in some quantity in the system. It may be due to lead which has been taken up by water or other beverage from lead pipes or vessels in which it has been contained. The use of lead in the arts is also a frequent cause of painful, and sometimes of fatal effects, from the metal finding its way into the system. The glazing of culinary vessels with lead; the coloring of confectionery with the chromate, chloride, or carbonate of lead; the sweetening of sour wine by litharge or oxide of lead, may all produce lead-poisoning more or less serious. But the most frequent and virulent cases occur among painters and persons engaged in white-lead factories; and four forms of disease, either simple or complicated, are apt to manifest themselves — 1, lead or painters' colic, or dry bellyache; 2, lead rheumatism or arthralgia: 3, lead palsy or paralysis, more particularly of the muscles of the fore-arm; and 4, Disease of the brain, manifested by delirium, coma, or convulsions — a form, however, of rare occurrence. Opium and cathartics are the chief medicines administered.

Leadville, Lake co., Colo., near head waters of Arkansas River, 150 mi. from Denver. Railroads: D. L. & G.; D. & R. G.; and Colorado Midland. Industries: three large smelters; greatest mining camp in Colorado. The town was first settled in 1878 and became a city in 1879. Pop. 1900, 12,455.

Leaf, the green deciduous part of a plant, usually shooting from the sides of the stem and branches, but sometimes from the root, by which the sap is supposed to be elaborated or fitted for the nourishment of the plant by being exposed to air and light on its extensive surface. When fully developed the leaf generally consists of two parts, an expanded part, called the *blade* or *limb*, and a stalk supporting that part, called the *petiole* or *leaf stalk*. Frequently, however, the petiole is wanting, in which case the leaf is said to be *sessile*. Leaves are produced by an expansion of the bark at a node of

the stem, and generally consist of vascular tissue in the veins or ribs, with cellular tissue or parenchyma filling up the interstices, and an epidermis over all. Some leaves, however, as those of the mosses, are entirely cellular.

Leaf Insects, popularly known by the name of *walking leaves.* Some of them have wing-covers so closely resembling the leaves of plants that they are easily mistaken for the vegetable productions around them. The eggs too have a curious resemblance to the seeds of plants.

Leaf Insect.

They are for the most part natives of the East Indies, Australia, and South America. The males have long antennæ and wings, and can fly; the females have short antennæ, and are incapable of flight.

League, a measure of length varying in different countries. The English land league is 3 statute mi., and the nautical league 3 equatorial mi., or 3.457875 statute mi. The French metric league is reckoned as equal to 4 kilomètres, or 4,374 yards.

League, an alliance or confederacy between princes or states for their mutual aid or defense. What in French history is known distinctively as *the League* was headed by Henry, duke of Guise, in 1576, against Henry III of France. Its ostensible object was the support of the Catholic religion, but the duke of Guise had further views of his own. As Henry III was without male heirs, the throne, at his death, would pass to the Protestant prince, Henry of Navarre, to exclude whom, and to obtain the throne for himself, were the real objects of the duke of Guise. His great popularity seemed to render the accomplishment of his design easy. The example given by Paris in his favor was followed by all the provinces. The league was sanctioned by the pope and the king of Spain. In 1588 the duke of Guise was murdered at Blois, with his brother Louis, the cardinal, at the king's instigation. The league then declared the throne vacant, and named the third brother, Charles, duke of Mayenne, governor general of the kingdom. Henry III now sought aid from his former enemy, Henry of Navarre, but was assassinated by a fanatic leaguer in 1589. The war was then pursued by the league against Henry of Navarre till it was ended, in 1594, by his uniting himself to the Catholic Church, and the next year the league was formally dissolved.

Leamington a watering place of England, in Warwickshire, 2 mi. e. of Warwick. Its sheltered position and the beauty of its scenery, together with the excellence of its medicinal springs, have gained it much favor. The springs, which include the three varieties of sulphurous, saline, and chalybeate, attract numerous visitors. Pop. 26,930.

Lea'otong (or Shing-king), a Chinese prov. in Manchuria (but now reckoned as part of China proper), stretching into the Yellow Sea between the gulfs of Leaotong and Corea. It has an area of 37,000 sq. mi., a pleasant climate, and is generally fertile. Pop. 6,000,000.

Leap Year, one of the years which contain 366 days, being every fourth year, which leaps over a day more than a common year. Thus in common years, if the first day of March is on Monday the present year, it will the next year fall on Tuesday; but in leap year it will leap to Wednesday, for leap year contains a day more than a common year, a day being added to the month of February. Every year is a leap year which is divisible by 4 without remainder, except the concluding years of centuries, every fourth only of which is a leap year; thus the years 1800 and 1900 are not leap years, but 2000 and 2400 are.

Lease, a permission to occupy lands or tenements for life or a certain number of years, or during the pleasure of the parties making the contract. The party letting the lands or tenements is called the *lessor,* the party to whom they are let the *lessee,* and the compensation or consideration for the lease the *rent.* A lease for a period not exceeding three years may be by verbal contract. If, however, the term be longer than three years, the lease must be by deed. A breach of any of the covenants contained in a lease was formerly sufficient to render it void, but now any breach may be compensated by a money payment. The power to lease necessarily depends upon the extent of the lessor's estate in the land or tenement to be leased. A proprietor who has only a life estate can of course lease his property only during his life. This is the case with a great part of the landed estates of Europe, the very object of entailments and other limitations being to secure the property against alienation, and against incumbrances to the prejudice of the heir or successor to the inheritance; and yet if the incumbent could not make a lease for a certain time it would be a great abridgment of the value of the estate to himself, as well as to his successor. The laws therefore provide that certain proprietors of estates for life may lease, on certain terms, for any time not exceeding a certain period, as 21 or 40 years. The English common law makes a distinction as to the dignity of leasehold estates, which in many cases does not correspond to their comparative value and importance, the maxim being that a life estate, being that of a freeholder, is greater or of more dignity than a lease for ever so many years, as a hundred or a thousand. A freehold is real estate; whereas a lease is but a chattel interest, though the term may be longer than the longest life.

Leather, the skins of animals dressed and

prepared for use by tanning, tawing, or other processes, which preserve them from putrefaction and render them pliable and tough. The skins employed are chiefly those of cattle, though the skins of horses, asses, sheep, pigs, and goats are also converted into leather. Hides are received by the leather maker in various states, those from a distance being usually cured by salting or sun drying, sometimes by both processes. Before subjection to the process of tanning, the cured hides require to be brought back as far as possible to the condition of fresh hides by soaking and softening in water, to which sometimes salt, or carbolic acid, or sulphide of sodium is added. The softening is now generally assisted by machines, which subject the skins to a kneading process. They are then unhaired by the agency of lime; the customary method of liming being to spread out the hides flat in milk of lime in large pits, the hides being "hauled" or drawn out once or twice a day, and the liquor stirred up: but there are several variations upon this method of liming. In America and on the European continent the hair is loosened by "sweating," which induces a partial putrefaction, attacking the root sheaths without injuring the hide substance proper. In the old method of warm sweating the hides were simply laid in a pile and covered, if necessary, with fermenting tan; the preferable cold method consists in hanging the hides in a moist chamber at a uniform temperature of 60° or 70° F. When the hair is sufficiently loosened the hides are usually thrown into the "stocks," where the slime and most of the hair is worked out of them. Other unhairing processes consist in treatment with alkaline sulphides, especially sulphide of sodium or sulphide of arsenic. To remove the loosened hair the hide is generally thrown over a beam and scraped with a blunt two-handled knife, but several unhairing machines have been invented. After unhairing the loose flesh and fat are scraped, brushed, or pared from the inner side, and the hides intended for sole leather are rounded or separated into "butts" and "offal"—the latter the thinner parts, including the cheeks, shanks, and belly pieces. The butts are then suspended for from twelve to twenty-four hours in soft fresh water, and frequently shaken in it to remove lime or dirt prior to undergoing the process of tanning and currying. The brilliant smooth surface of patent, enameled, lacquered, varnished, or japanned leather is due to the mode of finishing by stretching the tanned hides on wooden frames and applying successive coats of varnish, each coat being dried and rubbed smooth with pumice stone. Other special kinds of leather are seal leather, Russia and Morocco leathers. Tawed leathers consist chiefly of the skins of sheep, lambs, kids, and goats treated with alum, or some of the simple aluminous salts, the principal tawing industries being the manufacture of calf kid for boots and glove kid. Chamois, or oil leather, is prepared by impregnating hides and skins with oils. The chief markets for leather in the U. S. are New York, Boston, and Philadelphia: in Britain, London, Leeds, and Bristol. Important European centers are Antwerp, Havre, Paris, Marseilles, Vienna, and Berlin.

Leather, Artificial, the general name of certain fabrics possessing some of the qualities, and often the appearance of leather. One of the earliest methods of fabrication consisted in applying oily pigments to cloth which was subsequently rolled and coated with a sort of enamel paint. An article of this sort, known under the name of leather cloth, was first produced in America about 1849. Another kind consists of leather parings and shavings reduced to a pulp, and then molded into buckets, machinery bands, picture frames, and other useful and ornamental objects. A so-called vegetable leather consists of caoutchouc dissolved in naphtha, spread upon a backing of linen. It is of considerable strength and durability, and is used for table covers, carriage aprons, soldiers' belts, harness, bookbinding, etc. Various other substitutes for leather have been recently introduced, one consisting of cloth with a thin facing of leather; but the commonest material is still obtained by varnishing textiles with coatings of some resinous substance, and then painting or embossing them.

Leatherhead, an Australian bird, a species of honey eater; so called from its head being devoid of feathers and presenting a leathery appearance. Called also *Friar bird.*

Leatherwood, a bush of the U. S., with small yellow flowers, flexible jointed branches, and a tough, leathery, fibrous bark, which is used by the Indians for thongs. The twigs are used for baskets, etc. Called also *Moose Wood* and *Wicopy.*

Leaven, dough in which fermentation has commenced, employed to ferment and render light the fresh dough with which it is mingled. Its use dates from remotest antiquity, the addition of yeast or barm being of modern date.

Leavenworth, Leavenworth co., Kansas, on Missouri River, 38 mi. above Kansas City. Railroads: A. T. & S. F.; Missouri Pacific; Union Pacific; L. T. & S. W.; Kansas City; Northwestern; and the C. R. I. & P. Industries: carriage, furniture, boiler, bridge, and pump works, a large glucose factory and many others. There are several coal mines in the vicinity. It has a very large shipping trade. Fort Leavenworth, a soldiers' home, the state penitentiary, and other institutions are located here. Pop. 1900, 20,735.

Lebanon, Lebanon co., Pa., on the Union Canal, 28 mi. w. of Reading. Railroads: Philadelphia & Reading; Cornwall & Lebanon; Cornwall. Industries: extensive iron manufactories, including large rolling mills, furnaces, etc., also manufactures of cars, machinery, organs, engines, pottery, furniture, and ropes. There are notably rich deposits of iron and coal in the vicinity. Population, 1900' 17,628.

Leb'anon, Mountains of; two nearly parallel mountain ranges in the north of Palestine, stretching from s.w. to n.e., and enclosing between them a valley about 70 mi. long by

15 mi. wide, known anciently as Cœlē-Syria. The range on the west is called Lebanon, and that on the east Anti-Lebanon; the Arabs, however, called the former Jebel-Libnan, and the latter Jebel-esh-Shurky. Lebanon, which runs almost parallel to the Mediterranean coast, is the far loftier range of the two, and presents almost a continuous ridge, its loftiest summit — Jebel Sunnin, near Beyrout — being about 10,000 ft. above the sea. Though under the snow limit, snow and ice remain throughout the year in the higher ravines. Anti-Lebanon claims the culminating point of the whole chain, Jebel-esh-Sheikh (about 11,000 ft.). In the south part of the chain the Upper Jordan has its source.

Lecky, WILLIAM EDWARD HARTPOLE (1838-1903), English historian, b. near Dublin; educated at Kingstown, Armagh and Trinity College. His *Leaders of Public Opinion in Ireland* in 1861 made his reputation as a writer. That year he settled in London, and became famous as an historical scholar. He received honorary degrees from Trinity, St. Andrews, Glasgow, Oxford and Cambridge. He became the representative of the University of Dublin in Parliament in 1895, where he attained distinction as a speaker and later was called to the Privy Council, but resigned in 1902. He was always a champion of Ireland. His best works besides the one mentioned are, *History of the Rise and Influence of the Spirit of Rationalism in Europe, History of European Morals from Augustus to Charlemagne, History of England in the Eighteenth Century, Map of Life, Democracy and Liberty.*

Lee, CHARLES (1731–1782), an American Revolutionary general. He was the son of a British officer and took part in Braddock's campaign in 1755, and served during the French and Indian War. He then returned to England, but removed to America in 1773. He was appointed major-general by congress in 1775. He took part in the siege of Boston, commenced the fortifications around New York, and was given credit for the victory at Charleston in 1776. He was captured in the autumn of that year, but was exchanged in season to take a command in the battle of Monmouth. His conduct at that time led to his reprimand and finally to his dismissal from the army.

Lee, FITZHUGH, born in Fairfax Co., Va., 1835. He graduated at West Point. At the outbreak of the Civil War he joined the Confederate forces, and rose to the rank of major-general. He was elected governor of Virginia in 1885 and held the office until 1890. In 1896 President Cleveland appointed him consul-general at Havana. He was asked to remain at that post when President McKinley came into office. He returned to the U. S. at the outbreak of the war between this country and Spain, and was appointed a major-general by President McKinley.

Lee, HENRY (1756–1818), an American revolutionary general, b. in Westmoreland co., Virginia, educated at Princeton College, and in 1776 appointed captain of a company of cavalry in Colonel Bland's Virginia regiment. In the memorable retreat of Greene before Lord Cornwallis, Lee's legion acquired fame as the rear guard of the American army, the post of the greatest danger. At the battles of Guildford Courthouse and Eutaw, and in other affairs, Lee specially distinguished himself. On the conclusion of the war he was sent to Congress as a delegate from Virginia, and in 1792 was chosen governor of that state. In 1801 he retired from public life.

Lee, RICHARD HENRY (1732–1794), a distinguished American of the Independence era, b. at Stratford, Westmoreland co., Virginia. He received part of his education in England, and after his return to his native country was chosen a delegate to the House of Burgesses from Westmoreland county. In the opposition to unjust British claims he played throughout a most important part, and on being sent as delegate from Virginia to the first American Congress at Philadelphia (1774) was at once recognized as a leader in that assembly. He drew up most of those addresses to the king and the English people which were admitted by his political opponents to be unsurpassed by any of the state papers of the time. When war became inevitable Lee was placed on the various committees appointed to organize resistance. On June 7, 1776, he introduced the motion finally breaking political connection with Britain. In consequence of weak health he was unable to serve in the field, but his activity as a politician was as unceasing as valuable. In 1784 he was unanimously elected president of the Congress, and when the Federal Constitution was established he entered the Senate for his native state. In 1792 he retired into private life, and d. in Virginia.

Lee, ROBERT EDWARD (1807–1870), American general, commander in chief of the Confederate army, and one of the most skillful tacticians who took part in the great Civil War, was b. in Virginia in 1807. In 1829 he left the military academy of West Point with the rank of second lieutenant of engineers. After making a tour in Europe he obtained a captaincy in 1838, and in 1847 was appointed engineer in chief of the army for the Mexican campaign, in which his brilliant services at Cerro Gordo, Contreras, Cherubusco, and Chapultepec (where he was wounded) speedily gained for him the rank of colonel. From 1852 to 1855 he was superintendent of military studies at West Point. In 1861 he became colonel of his regiment, but on the secession of Virginia from the Union he threw up his commission, was intrusted with the command of the Virginian army, and subsequently was selected by President Davis as commander in chief. In June, 1862, he defeated the Federal army under McClellan, and, aided by Stonewall Jackson, defeated Pope in a series of engagements commencing August 20, and ending with the victory of Manassas Junction on the 30th. Lee now crossed the Potomac into Maryland to threaten Washington itself, but a series of checks obliged him to withdraw behind the Rappahannock. On December 13 he routed the Federalists under Burnside at Fredericks-

burg, and on May 2 and 3, 1863, gained the victory of Chancellorsville over Hooker. After this Lee resolved on an invasion of Pennsylvania, but was beaten by Mead at Gettysburg, July 1 and 3, and forced to retreat into Virginia. The campaign of 1863 ended in August. The campaign of 1864 was begun by the advance of General Grant on May 4. A succession of stubbornly contested battles followed from the Wilderness by way of Spottsylvania and Cold Harbor to Petersburg. On April 2, 1865, Grant broke through Lee's defenses. Lee made an attempt to unite with Johnston, but was prevented. The Union forces with their great superiority of men gradually hemmed in the Confederate army, which on April 9 surrendered to Grant at Appomattox C. H. General Lee retired into private life; was elected president of Washington College, Lexington, Va., in 1865. Pl. 20, Vol. III.

Leech, a name for those worms that form the type of the order Hirudinea of that class. The distinctive feature of the leeches consists in the presence of one or two sucking discs. The rings or segments of the body are very numerous and closely set. Usually leeches breathe either by the general surface of the body or by little sac-like pouches known as the respiratory *sacculi*. They chiefly inhabit freshwater ponds, though some live among moist grass, and some are marine. The familiar horse leeches of fresh water ponds and ditches are included in this group. The land leeches of Ceylon are terrestrial in habits, living among damp foliage and in like situations. They fasten on man and beast, and are a serious pest to travelers. The species generally employed for medical purposes belong to the genus *Sanguisūga*, and are usually either the Hungarian or green leech, used in the s. of Europe, or the brown speckled or English leech, used in the n. of Europe. The mouth, situated in the middle of the anterior sucker, is provided with three small white teeth, serrated along the edges, and capable of inflicting a peculiar Y-shaped wound, which, like that produced by the soldier's bayonet, is difficult to close, and permits a large and continous flow of blood. From four drachms to one ounce may be stated to be the average quantity of blood that can be drawn by a leech. After detaching themselves, leeches are made to disgorge the blood they have drawn by being placed in a weak solution of salt, or by having a little salt sprinkled over them. Leeches appear to hibernate in winter, burying themselves in the mud at the bottom of the pools, and coming forth in the spring.

Leech, John (1817–1864), an English artist and humorist, educated at the Charterhouse School. He studied at St. Bartholomew's Hospital for a time, but forsook medicine, and commenced drawing on wood for publications. His first important work was illustrations to the Ingoldsby Legends. In 1841 he joined the staff of *Punch*, his first drawing appearing in August of that year. For that periodical he worked with pre-eminent success, supplying weekly political satires and pictures of all phases of English life, showing no less artistic power than versatile humor. His designs for *Punch* have nearly all been republished as *Pictures of Life and Character*, and as *Pencillings from Punch*. He also executed the illustrations for *Mr. Sponge's Sporting Tour*, *The Comic History of England*, and other books. No artist has excelled John Leech in his particular line.

Leeds, a manufacturing town of England, in the West Riding of Yorkshire, on the river Aire, which here becomes navigable, and is crossed by eight bridges; 185½ mi. by railway n. n. w. from London. Leeds has been for generations the chief site of the woolen manufacture of Yorkshire. In the wholesale clothing trade several thousand hands are employed, as also in steel works, iron foundries, rolling mills, tool and machine factories. The boot and shoe factories, the leather trade, and the cloth-cap trade also employ large numbers of men and women, and there are extensive color-printing works, tobacco manufactories, chemical and glass works, works for making drainage pipes, fire-bricks, terra cotta pottery, etc. Nearly a hundred collieries are worked in the district. The history of Leeds extends over more than 1,200 years, the town being mentioned under the name of *Loid* or *Loidis* by the Venerable Bede as the capital of a small British kingdom about 616. In the neighborhood is the fine ruin of Kirkstall Abbey. Pop. 367,506.

Leek, a mild kind of onion much cultivated for culinary purposes. The stem is rather tall, and the flowers are disposed in compact balls, supported on purple peduncles.

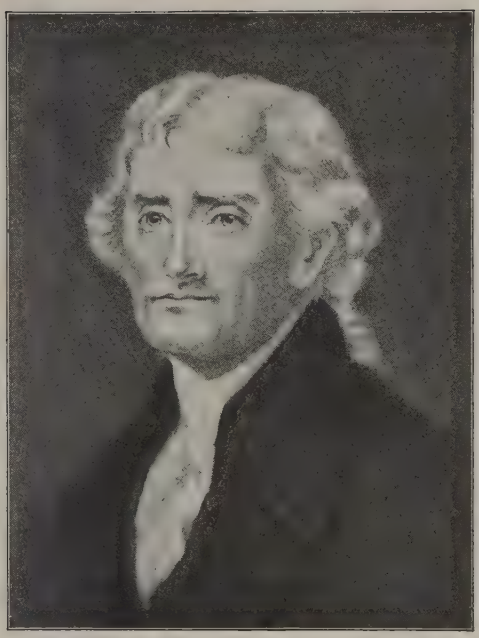
Leeuwarden (lā′u-vär-den), a town of Holland, capital of the province of Friesland, on the Ee, 70 mi. n.e. of Amsterdam, intersected by numerous canals. The principal edifices are the palace of the former stadtholders of Friesland, several churches, townhouse and provincial courthouse. The industrial establishments are various. Pop. 30,689.

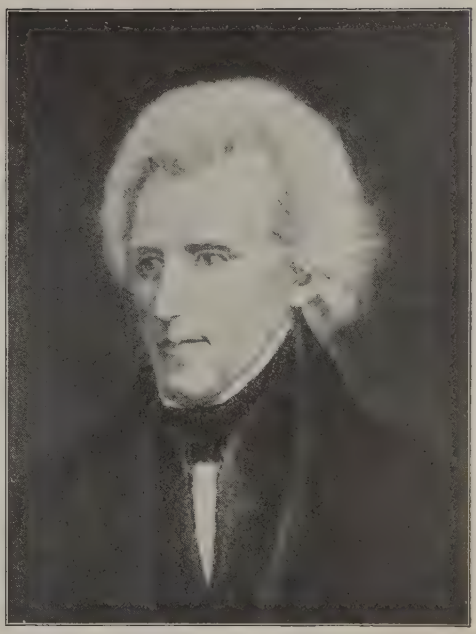
Leeuwenhoeck (lā′u-ven-hök), Antonyvan (1632–1723), Dutch microscopist. He completed Harvey's discovery of the circulation of the blood by showing that it passes from the arteries to the veins through the capillaries. He also discovered the red corpuscles of the blood, the spermatozoa; the infusorial animalcules, etc. He contributed papers to the Philosophical Transactions of the Royal Society, London.

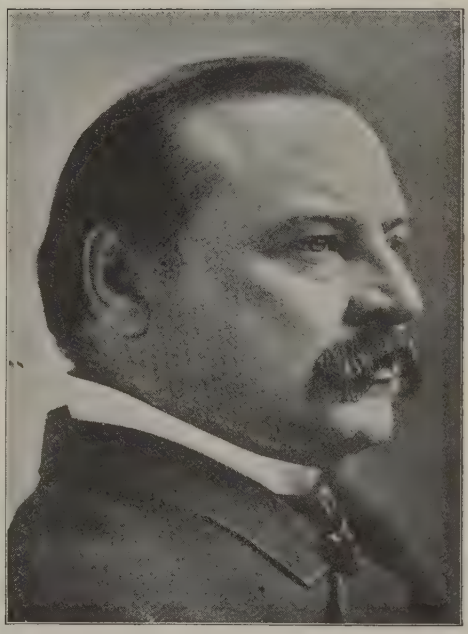
Leeward Islands. See *West Indies*.

Leg, any limb of an animal that is used in supporting the body, and in walking and running; and in a narrow sense that part of the human limb from the knee to the foot. See *Anatomy*.

Legacy, a gift by will of personal property, as goods and chattels: a testamentary gift of real property being called a *devise*. The mode of compelling executors to pay a legacy is by suit in equity for the administration of the testator's assets; courts of common law have not, in general, any jurisdiction. Executors cannot be compelled to pay a legacy until the







PRESIDENTS

Thomas Jefferson
James Monroe

Andrew Jackson
Grover Cleveland

Plate 22, Vol. III

expiration of a year after the testator's death. After a legacy is paid the legatee must refund if it should be necessary for the payment of creditors who come in, although after the period above mentioned. The party to whom a legacy is bequeathed is termed the *legatee.*

Le'gend, originally the title of a book containing the lessons that were to be read daily in the service of the early church. The term legend was afterward applied to collections of biographies of saints and martyrs, or of remarkable stories relating to them, because they were read at matins and in the refectories of cloisters, and were earnestly recommended to the perusal of the laity. The Roman breviaries contain histories of the lives of saints and martyrs, which were read on the days of the saints whom they commemorated. They originated in the twelfth or thirteenth century, and they contributed much to the extinction of the old German (heathen) heroic traditions. Among the best known collections were the *Legenda Sanctorum or Historia Lombardica,* and *Golden Legend.* The term is used in a general sense for any remarkable story handed down from early times, and is also applied to the motto or words engraved in a circular manner round the head or other figure upon a medal or coin.

Legendre (lē-zhän-dr), Adrien Marie (1752–1833), mathematician, early a professor of mathematics in the military school there, and in 1783 a member of the Academy. In 1787 he was employed along with Cassini and Mechain, to measure a degree of latitude between Dunkirk and Boulogne, while English mathematicians did the same on the other side of the Channel. He particularly distinguished himself by profound investigations as to the attraction of elliptical spheroids, and his method of calculating the course of the comets.

Legerdemain (lej-ẽr-de-mān') (Conjuring), a popular amusement or exhibition, consisting of tricks performed with such art and adroitness that the manner or art eludes observation. All the phenomena of legerdemain are referable to sleight of hand, mechanical contrivances, confederacy, or some combination of these. In the more elaborate phases of the art the aid of optical, chemical, and other sciences is utilized.

Leghorn (Italian, *Livorno*), a seaport of Northern Italy, in the province of Leghorn or Livorno, on the Mediterranean, 12 mi. s.s.w. of Pisa and 50 mi. w.s.w. of Florence. Leghorn is for the most part modern, and well built. Among objects of interest are the Duomo or Cathedral; the church of the Madonna; a synagogue richly ornamented with marbles; the English chapel and cemetery (containing Smollett's tomb); the lazarettos, particularly San Leopoldo, one of the most magnificent works of the kind in Europe; etc. The manufactures are varied. Shipbuilding is carried on, and within recent years several ironclads have been constructed in the dock yards. Leghorn was a mere fishing village when it came into the possession of the Florentines in 1421, and it continued to be a place of no importance till the sixteenth century. It now ranks among the chief ports after Genoa and Naples. Pop. 96,937.

Leghorn, a kind of plait for bonnets and hats made from the straw of bearded wheat cut green and bleached; so named from being imported from Leghorn.

Legion, in ancient Roman armies a body of infantry consisting of different numbers of men at different periods, from 3,000 to above 6,000, often with a complement of cavalry. Each legion was divided into ten cohorts, each cohort into three maniples, and each maniple into two centuries. Every legion had sixty centurians, and the same number of *optiones* or lieutenants and standard-bearers. The standard of the legion was an eagle.

Legion of Honor (*Légion d' Honneur*), a French order for the recognition of military and civil merit, instituted by Napoleon while consul, May 19, 1802, and inaugurated July 14, 1804. The decoration originally consisted of a star containing the portrait of Napoleon surrounded by a wreath of oak and laurel, with the legend, "Napoléon Empereur des Français;" on the reverse was the French eagle with a thunderbolt in his talons, and the legend, "Honneur et Patrie." The order has been remodeled several times, the last occasion being subsequent to the downfall of the second empire. There are now five ranks or classes: ordinary chevaliers or knights, officers, commanders, grand officers, grand crosses. The profuse granting of the decoration of the order latterly brought the institution into discredit, and the number of chevaliers is now restricted to 25,000, the officers to 4,000, the commanders to 1,000, the grand officers to 200, and the grand crosses to 70. The star now bears a figure emblematic of the republic, with the inscription "République Française, 1870," on the reverse two flags, with the inscription, "Honneur et Patrie."

Legumino'sæ, one of the largest and most important natural orders of plants, including about 7,000 species, which are dispensed throughout the world. They are trees, shrubs, or herbs, differing widely in habit, with stipulate, alternate (rarely opposite), pinnate, digitately compound or simple leaves, and auxiliary or terminal one or many flowered peduncles of often showy flowers, which are succeeded by a leguminous fruit. Four sub-orders are recognized: Papilionaceæ, Swartzieæ, Cæsalpinieæ, and Mimoseæ. It contains a great variety of useful and beautiful species, as peas, beans, lentils, clover, lucern, sainfoin, vetches, indigo, logwood, and many other dyeing plants, acacias, senna, tamarinds, etc.

Lehigh River, a river of Pennsylvania, rising in Pike county and joining the Delaware at Easton after a course of 100 mi., of which 70 are navigable.

Lehigh University, an institution of Pennsylvania at South Bethlehem, founded and liberally endowed by Asa Packer for the instruction (without charge) of young men from any part of the country or of the world. It has fine buildings, a library of over 60,000

vols., etc. It gives instruction in the various branches of general literature and technology.

Leibnitz (līb'nits), GOTTFRIED WILHELM, BARON VON (1646–1716), German scholar and philosopher, b. at Leipsic. He studied law, mathematics, and philosophy at the university of his native town, where he published a philosophical dissertation, as early as 1663. This was followed by several legal treatises, and by a remarkable philosophico-mathematical treatise. After holding political appointments under the elector of Mainz he went to Paris in 1672, and there applied himself particularly to mathematics. He also went to England, where he was elected a member of the Royal Society, and made the acquaintance of Boyle and Newton. About this time he made his discovery of the differential calculus. The duke of Brunswick Lüneburg then gave him the office of councilor and a pension, and after a further stay in Paris he returned to Hanover in 1676, and entered upon the superintendence of the library. Being commissioned to write the history of the house of Brunswick-Lüneburg Leibnitz went (1687) to Vienna, and thence to Italy. About this time he proposed a scheme to reunite Protestants and Catholics. Having assisted the elector of Brandenburg (afterward Frederic I of Prussia) to establish the Royal Academy of Sciences at Berlin, he was made president for life (1700). He was also made a privy councilor by the Czar Peter the Great. In 1710 he published his celebrated *Essai de Théodicée,* on the goodness of God, human liberty, and the origin of evil, in which he maintained the doctrines of pre-established harmony and optimism, and which was followed by his *Nouveaux Essais sur l'Entendement Humain.* A sketch of his philosophy was given by him in his *Monadologie,* 1714. His controversy with Newton concerning the discovery of the differential calculus, and the pains of the gout, embittered the close of his active life.

Leicester (les'tĕr), the county town of Leicestershire, England. The manufactures are cotton and worsted hosiery, elastic webs, ironware, boots and shoes, shawls, lace, thread, etc. Leicester is a place of considerable antiquity, and was known to the Romans under the name of Ratæ. Its walls and strong castle were demolished in the reign of Henry II. It suffered severely during the wars of Lancaster and York, and also during the Parliamentary War, having in the latter been first taken by storm by the royalists, and then retaken by the republicans. Pop. 142,051.

Leicester, ROBERT DUDLEY, EARL OF (1532–1588), fifth son of John Dudley, duke of Northumberland. In 1549 he was married to Amy Robsart, daughter of a Devonshire gentleman, and is said to have been accessory to her murder in 1560. Elizabeth created him earl of Leicester and privy-councilor, and bestowed titles and estates on him lavishly. Her fondness for him caused his marriage with her to be regarded as certain. His marriage with the countess of Essex in 1578 mortally offended her. He successfully commanded in the Low Countries, and when England was threatened by the Spanish Armada, in 1588, was appointed lieutenant general.

Leidy, JOSEPH (1823–1891), naturalist, was b. in Philadelphia. In 1845 became prosector to the chair of anatomy in University of Pennsylvania, in 1853 professor, and in 1884 director of the department of biology. His published papers on biological subjects number over 800.

Leighton (lā'ton), FREDERICK, LORD (1830–1896), an English painter, president of the Royal Academy, b. at Scarborough. At fourteen he entered the Academy of Berlin, but a year later went to Frankfort-on-Main to continue his general education. From Rome, where he spent some three winters, he sent to the Academy of 1855 his picture of *Cimabue's Madonna* carried in procession through the streets of Florence, which called forth general admiration, and was purchased by the queen. For four subsequent years he resided at Paris, availing himself of the friendly counsel of Ary Scheffer, Robert Fleury, and other painters, and then finally took up residence in London. In 1864 he was elected an associate of the Royal Academy, and in 1869 an Academician. In 1878 he succeeded Sir Francis Grant as president of the Academy, was knighted, and was named an officer of the Legion of Honor. From the long list of his works, special mention may be made of his *Hercules Wrestling with Death; The Daphnephoria, The Music Lesson, Sister's Kiss, Phryne, Cymon and Iphigenia, Captive Andromache,* and *Ball Players;* and the large frescoes at the South Kensington Museum representing the *Industrial Arts Applied to War,* and the *Arts of Peace.* In addition to his pictures he has achieved a high place as a sculptor, by his *Athlete Strangling a Python,* and his *Sluggard.* The special merit of his work lies in the perfection of his draughtsmanship and design; his coloring, though possessing unfailing charm of harmonious arrangement, being only thoroughly satisfactory from the decorative point of view. A fine poetic quality, conjoined with elegance in drawing and great refinement in execution, marks his whole work.

Leipsic (līp'zik) (or Leipzig), the second city of the kingdom of Saxony, and one of the chief seats of commerce in Germany, 64 mi. w.n.w. from Dresden. The market place in the old town has a picturesque appearance, having about it the town hall (Rathhaus), built in 1556, and other buildings in the Renaissance style. It contains a fine war monument erected in 1888. The Augustus-Platz is one of the finest squares in Germany, overlooked by the university, museum, new theater, etc. The Pleissenburg or castle, now partly used as a barrack, withstood the attacks of Tilly, and is memorable as the scene of the famous Leipsic disputation between Luther and Dr. Eck, in 1519. The suburbs contain the post office buildings, the church of St. John, the fine, new church of St. Peter, and the Roman Catholic church; the Rosenthal (Valley of Roses), with pleasant, wooded walks; and numerous places of recreation. The university,

founded in 1409, is the second in importance in Germany (that of Berlin being first), and has over 3,000 students, and a library of 350,000 vols. Schools are numerous and good, the conservatory of music being of some celebrity. Besides being the center of the book and publishing trade of Germany, Leipsic possesses considerable manufactures, and has important general commerce, carried on especially through its three noted fairs at the New-year, Easter, and Michaelmas. Leipsic is of Wendish origin, and dates from the eleventh century. It early received the Reformation. In 1631 Gustavus Adolphus defeated Tilly near it at Breitenfeld. It suffered much from the Seven Years' War. On Oct. 16–19, 1813, the great "battle of the nations" (Völkerschlacht) was fought around and in Leipsic, in which Napoleon received his first defeat. Pop. 353,272.

Leith (lēth), a seaport in the county of Midlothian, Scotland, about 1½ mi. from the center of Edinburgh. The chief manufactures are ropes, sail cloth, soap, candles, paints, colors, artificial manures, and there are breweries, distilleries, ship building yards, sugar refineries, iron foundries, engine works, etc. There are extensive wet docks, and three public graving docks, capable of receiving the largest vessels. Leith is mentioned for the first time, under the name of Inverleith, in a charter of David I granted in 1128; and in 1329 a charter of Robert I made a grant of the port and mills of Leith to the city of Edinburgh.

Leitha (or Leytha) (lī'tà), a river of Lower Austria and Hungary, joining the Danube at Altenburg.

Leitrim (lē'trim,) a county of Ireland, area 392,363 acres. The principal crops are oats and potatoes. The minerals include iron, lead, and copper, all at one time worked, and coal, still raised to some extent. County town, Carrick-on-Shannon. Pop. 78,397.

Leland, CHARLES GODFREY (1824-1903), American author, b. at Philadelphia; studied law, but abandoned it for a literary life. He is best known through his quaint *Hans Breitmann Ballads* in Pennsylvania Dutch and his works on the language and poetry of the Gypsies. Died in Florence, Italy, Mar. 20, 1903.

Leland Stanford Junior University, an institution of higher learning at Palo Alto, Cal., founded in 1885 by Leland Stanford and his wife, in memory of their only child Leland Stanford, Jr., who died in 1884. The university was opened to students in 1890. It maintains departments of liberal arts, law, art, mining, and civil, mechanical and electrical engineering. Degrees are conferred without regard to the time spent, whenever the requirements are met. The Hopkins Library of Natural History at Pacific Grove is a branch of the biological department of the university. In 1904 the university had a faculty of 130 members, and an attendance of 1,400 students. The library numbered 80,000 volumes, including the Hopkins Railway Library, a valuable Australasian Library and the Hildebrand collection of works on Germanic philology and literature. The president is David Starr Jordan.

Le'ly, SIR PETER (1617–1680), painter, b. at Soest, in Westphalia. Lely, or Le Lys, was properly a nickname borne by his father, whose family name was Van der Taes. He was first instructed by Peter Grebber at Haarlem, but went to England in 1641, and commenced portrait painting. He finished portraits both of Charles I and of Cromwell; but it was not until the Restoration that he rose to the height of his fame. He fell in with the voluptuous taste of the new court, and was in great favor with Charles II, who knighted him. The Hampton Court collection of portraits of the ladies of the court of Charles II contains some of his best work; the finest of his few historical works being the *Susannah and the Elders, at Burleigh House.*

Leman, LAKE, a name sometimes given to the Lake of Geneva. See *Geneva, Lake of*

Lemberg (Polish, *Lwow*), a city of Austria, capital of the Kingdom of Galicia, 365 mi. e.n.e. from Vienna. It has a university (library 86,000 volumes), attended by about 1,400 students; and the Ossolinsk Literary Institute (library 78,000 volumes). The manufactures are extensive and varied, and there is a large trade, which is very much in the hands of the Jews, who here number more than 30,000. Pop. 109,746.

Lemming, a rodent mammal very nearly allied to the mouse and rat. There are several species, found in Norway, Lapland, Siberia, and the northern parts of America. The most noted species is the common or European lemming of which the body color is brownish variegated with black; the sides of the head and belly white, or of a grayish tint. The legs and tail are of a gray color. The head is large and shortened, the body thick-set, and the limbs stout. It feeds on plants, and is exceedingly destructive to vegetables and crops. It burrows under the ground at a limited depth. It is very prolific, and vast hordes sometimes migrate toward the Atlantic and the Gulf of Bothnia, destroying all vegetation in their path. Great numbers of wild animals—bears, wolves, foxes—hang upon them in their march, making them their prey, thus tending to keep their numbers in some degree in check.

Lemnian Earth, a kind of astringent medicinal earth, of a fatty consistence and reddish color, used in the same cases as bole. It removes impurities like soap. It was originally found in Lemnos, but occurs also in Bohemia, Russia, and India, resulting from decay of feldspathic rocks, like kaolin, to which it is related. Called also *Sphragide.*

Lemnos (now *Stalimene*), the most northerly island of the Grecian Archipelago, between the Hellespont and Mount Athos. It has an area of 146 sq. mi., and abounds in vines, wheat, etc. The principal town on the island is Limno or Kastro. Lemnos formerly contained a volcano, Mosychlus, which was regarded as the workshop of Hephaistos (Vulcan). Pop 22,000.

Lem'on, the fruit of the lemon-tree, origi-

nally brought from the tropical parts of Asia, but now cultivated very extensively in the south of Europe especially in Sicily. It is congeneric with the orange and citron, and belongs to the natural order Aurantiaceæ. It is a knotty-wooded tree of rather irregular growth, about 8 ft. high; the leaves are oval, and contain scattered glands which are filled

Lemon.

with a volatile oil. The shape of the fruit is oblong, and its internal structure is similar to that of the orange. The juice is acid and agreeable; and in addition to its uses in beverages is employed by calico printers to discharge colors. As expressed from the ripe fruit it has a specific gravity of 1.04, and contains about 1.5 per cent of citric acid. It also contains sugar, albuminous and vegetable matters, and some mineral matter, nearly half of which consists of potash. The *oil of lemon* is a volatile oil of yellow or greenish color got from the fresh rind of the lemon. It is used in perfumery, and in medicine as a stimulant and rubefacient; it also forms an ingredient of syrup of lemon and tincture of lemon.

Lemon extract.—The process of making lemon extract is unique. The best essence or oil comes from Sicily. The best and largest fruit is picked and shipped directly to the market. The small and imperfect ones are picked before they are entirely ripe and divided into sections. After lying in the sun for a day, the lemons are taken one by one, the pulp is scraped off and the lemon oil squeezed out. The oil is then placed in copper vessels and hermetically sealed. In this condition the oil comes to the factories in America. The copper cases are opened and oil to the amount of 25 pounds is taken out. The first process is the removing of the balsamic oils. When the oil comes out it is yellow and almost clear. It is "cut" with deodorized spirits and then sent into the filter room. Here are a number of large glass bottles. In the top of each there is a funnel fitted with ordinary druggist's filter paper. When the liquor is strained through into the bottles it is clear and yellow, ready for bottling. One pound of oil makes, with the spirits added, one gallon of extract. Orange extract is made exactly like lemon extract. Extracts from the fruit of the strawberry, pineapple, raspberry, banana, pear, and apricot cannot be made. Artificial extracts with the flavor of these fruits are made. Peach extract is made from peach pits.

Lemon, Mark (1809–1870), English humorous and dramatic writer. He made his first literary essays in the lighter drama, supplying the London stage with more than sixty pieces, farces, melodramas, and comedies. On the establishment of *Punch* in 1841 he became joint editor with Henry Meyhew, and two years later sole editor. He was also literary editor of the *Illustrated London News* and an occasional writer for Dickens's *Household Words*, *Once-a-Week*, and other periodicals. Among his later productions are some novels of average merit.

Le'mur, a name popularly given to any member of the Lemuroida, a sub-order of monkeys, but more strictly confined to members of the family Lemuridæ. Their zoological position has been a matter of considerable debate, as they possess characteristics which distinguish them from the monkeys, and ally them with the insectivores and rodents. The simplest classification places them, however, with the lower Quadrumana. The Lemuridæ or True Lemurs are specially distinguished by the habitually four-footed or quadrupedal

Ring-tailed Lemur.

mode of progression. The tail (except in the short-tailed Indris) is elongated and furry, but is never prehensile. The hind limbs are longer than the fore limbs; the second toe in the hind foot being long and claw-like, and the nails of all the other toes being flat. The fourth digit of the hand, and especially of the foot, is longer than the others. The thumb can always be opposed to the other fingers, and has a broad, flattened nail. The ears are small and the eyes large. The incisor teeth are gen-

erally four, the canines two, and the molars twelve in each jaw. The true lemurs are exclusively confined to Madagascar and neighboring islands, but other members of the family are found in Africa and as far east as the Philippines. They are all arboreal in their habits, and subsist chiefly upon a vegetable diet, but also eat insects, and the smaller birds and their eggs.

Lem'ures, among the ancient Romans, the name given to the ghosts or souls of the dead. In order to appease them a ceremony called *lemuria* was observed on the nights of May 9, 11, and 13.

Lemu'ria, a hypothetical continent supposed by some to have at one time extended from Madagascar and South Africa across what is now the Indian Ocean to the Asiatic Archipelago; named from its corresponding with the habitat of the lemurs.

Lena, a river of Siberia, one of the largest in the world. Its course, windings included, is about 2,770 mi.

Lenni-Lenape, the name by which the Delaware Indians call themselves. See *Delaware.*

Lenox, JAMES (1800–1880), American philanthropist, b. in New York City. From his father he inherited several millions of dollars. For half a century his time was devoted to the forming of a library and gallery of paintings, which he conveyed to New York City in 1870, the total value being over $2,000,000. He was a liberal donor to many churches and societies.

Lens, a transparent substance, usually glass, so formed that rays of light passing through it are made to change their direction, and to magnify or diminish objects at a certain distance. Lenses are double convex, or convex on both sides; double concave, or concave on both sides; plano convex, or plano concave, that is, with one side plane and the other convex or concave, or convex on one side and concave on the other. If the convexity be greater than the concavity, or if the two surfaces would meet if produced, the lens is called a *meniscus;* and if the concavity be greater than the convexity, the lens is termed *concavo-convex.*

Lent, the forty days' fast in spring, beginning with Ash Wednesday and ending with Easter Sunday. In the Latin Church Lent formerly lasted but thirty-six days; in the fifth century four days were added, in imitation of the forty days' fast of the Saviour, and this usage became general in the Western Church. The close of Lent is celebrated in Roman Catholic countries with great rejoicings, and the Carnival is held just before it begins. The English Church has retained Lent and many other fasts, but gives no directions respecting abstinence from food.

Lentil, a plant cultivated in Southern and Central Europe. It is an annual, rising with weak stalks about 18 in., and with whitish flowers hanging from the axils of the leaves. Two varieties are cultivated—the large *garden lentil* and the common *field lentil,*—the former distinguished by its size and the greater quantity of mealy substance which it will afford. The straw of lentils makes good fodder. As food for man the seeds are very nutritious, and in Egypt, Syria, etc., are a chief article of diet.

Leo, the Lion, the fifth sign of the zodiac, between Cancer and Virgo. The sun enters it about July 22, and leaves it about August 23. The constellation contains 95 stars, and is noteworthy for its remarkable nebulæ.

Leo XIII, (GIOVACCHINO VINCENZO PECCI) (1810–1903), Pope of the Roman Catholic Church (see *Pope*); b. at Carpiento, Italy, March 2, 1810. He became titular archbishop in 1843, was apostolic delegate successively of Benevento, Spoleto and Perugia. He was raised to the rank of Cardinal in 1853, and in 1877 was appointed Chamberlain of the Sacred College. On Feb. 20, 1878, the Conclave of Cardinals elected him successor to Pius IX. The new Pope at once made known his election to the powers, and his first official act, March, 1878, was to restore the Roman Catholic hierarchy of Scotland, thus inaugurating a policy somewhat different from that of his predecessor. The same year he also directed that the canon law be introduced into the Roman Catholic Church in the United States. The order removed this country from the missionary field and placed it in regular standing in the propaganda with the other Roman Catholic countries. In 1879 the Pope issued an encyclical aimed at Socialists, Communists and Nihilists. The Czar ordered this to be read in all the Roman Catholic churches of Russia. The policy of Leo XIII was to harmonize the diversified opinions and interests of the church, and to strengthen all lines of work which it is authorized to undertake. He died July 20, 1903. Pl. 5, Vol. I.

Leon, a town of Spain, capital of the province and ancient kingdom of the same name, 176 mi. n.w. of Madrid. Pop. 11,314. The province has the Asturias as its northern boundary, a branch of which mountains divides it into two portions. The western portion is adapted rather for pasture than tillage, but the eastern has wide and undulating plains, on which the vine and various grain crops are successfully cultivated. Area 6,166 sq. mi.; pop. 370,000.

Leon, a town of Central America, capital of the department of Leon, state of Nicaragua, on a large and fertile plain near the Pacific coast. It is regularly built, and the public buildings, which are considered among the finest in Central America, include a massive cathedral, an old episcopal palace, a new episcopal palace, and several churches. A railway connects it with the coast at Corinto. The town has suffered a good deal from the civil wars. Pop. 25,000.

Leon, a town of Mexico, state of Guanajuato, on a fertile plain more than 6,000 ft. above sea level, a well-built place, with flourishing industries of various kinds, which its railway connections are helping to develop. Pop. 47,739.

Leonardo da Vinci. See *Vinci.*

Leon'idas, in Greek history, a king of Sparta, who ascended the throne 491 B.C. When Xerxes invaded Greece, the Greek congress

assigned to Leonidas the command of the force destined to defend the pass of Thermopylæ. His force, according to Herodotus, amounted to over 5,000 men, of whom 300 were Spartans. After the Persians had made several vain attempts to force the pass, a Greek named Ephialtes betrayed to them a mountain path by which Leonidas was assailed from the rear, and he and his followers fell after a desperate resistance (B.C. 480).

Leopard, a carnivorous mammal inhabiting Africa, Persia, India, China, etc., by some regarded as identical with the panther. The ground or general body color of both is a yellowish fawn, which is slightly paler on the sides, and becomes white under the body. Both are also marked with black spots of various sizes, irregularly dispersed, a number of

Leopard.

them being ring-shaped. The African animal seems to have these ring-spots chiefly on the back, and to this form some would specially assign the name of leopard. It preys upon antelopes, monkeys, and the smaller quadrupeds, rarely attacking man unless itself attacked. It can ascend trees with great ease, often using them both for refuge and ambush. It is not infrequently trapped by means of pitfalls. Besides the common leopard there is also a useful and docile Asiatic species, the chetah or hunting leopard. See *Chetah.*

Leopard's Bane, natural order Compositæ, a robust plant, with large roughish leaves and conspicuous yellow flower heads.

Leopard Wood, the wood of a tree of Trinidad and Guiana, allied to the cow tree.

Le'opold I (1790–1865), king of the Belgians, son of a duke of Saxe-Coburg. In 1816 he married the Princess Charlotte, heir apparent of Great Britain, who d. in 1817. In 1831 he accepted the crown of Belgium. He married a daughter of King Louis Philippe of France, by whom he became the father of Leopold II, the present Belgian sovereign.

Lepan'to (or Epacto) (ancient *Naupactus*), a seaport town of Greece, in the nome of Phocis, on the Gulf of Corinth or Lepanto, near the Strait of Lepanto. Its harbor is now silted up, but it was anciently of considerable importance. It is memorable for the naval battle, from which dated the decline of the Turkish power in Europe, fought within the gulf on Oct. 7, 1571, between the Ottoman fleet and the combined fleets of the Christian states of the Mediterranean, under Don John of Austria, when the former, consisting of 200 galleys and 60 other vessels, was destroyed. The strait connects the Gulf of Corinth with the Gulf of Patras, and is about 1 mi. wide at its narrowest part.

Leper. See *Leprosy.*

Lepid'olite (or Lithia Mica), a species of mica, occurring in oblique, rhombic, or hexagonal prisms, or in masses composed of small crystalline scales. Its color is pink or peach-blossom, passing into gray; luster pearly; easily split into thin, translucent, flexible scales or plates. The mineral is one of the principal sources of the metal lithium.

Lep'idus, M. ÆMILIUS, Roman triumvir, prætor B.C. 49, consul with Julius Cæsar in 46, and in 44 appointed by Cæsar to the government of Narbonese Gaul and Nearer Spain. He was in Rome at the time of Cæsar's death, and joined Mark Antony. In 43 he united with Antony and Octavianus to form the triumvirate, obtaining Spain and Narbonese Gaul in the division of the empire. After the battle of Philippi (42) a revision took place, in which Lepidus received Africa, where he remained till 36, when he was summoned by Augustus to assist him against Sextus Pompey. He then tried to seize Sicily, but was overcome by Augustus, who deprived him of his triumvirate, and banished him to Circeii, where he lived under strict surveillance. He d. B.C. 13.

Lep'rosy (Greek, *lepros*, rough), a name applied at one time to several different skin diseases characterized by roughness or scaliness. True leprosy is the elephantiasis of the Greeks, the lepra of the Arabs, whose old English name was the *myckle ail* or great disease. It is to be distinguished from the elephantiasis of the Arabs, which is a local overgrowth of skin and subcutaneous tissue, chiefly of the extremities and genital organs, and is non-contagious. Of true leprosy there are several well-marked types. The first is characterized by the formation of nodules or tubercles in the skin, common about the eyebrows, where they destroy the hair, and produce a frowning or leonine aspect. After a time the nodules break down, forming ulcers, which discharge for a time, and may cause extensive destruction and deformity. The tubercles may form in the nostrils, in the throat altering the voice, on the eyelids extending into and destroying the eyeball. In the second type the chief features are insensibility and numbness of parts of the skin, accompanied by deep-seated pains, causing sleeplessness and restlessness. In a third variety much mutilation occurs owing to the loss of bones, chiefly of the limbs, a portion of a limb being frequently lopped off painlessly at a joint. All these varieties begin with the appearance on the skin of blotches of a dull coppery or purplish tint, the affected part being thickened, puffy, and coarse-looking. When the redness disappears a stain is left, or

a white blotch. Leprosy is now believed to be caused by a minute organism—a bacillus (see *Germ Theory of Disease*), and to be contagious. Though the disease is not so widespread as at one time it was, it still prevails in Norway and Iceland, the coasts of the Black Sea and Mediterranean, in Madagascar, Mauritius, Madeira, the Greek Archipelago, East and West Indies, Palestine, the Pacific Islands, etc.

Ler'ida (ancient *Ilerda*), a town of Spain, province of Lerida, Catalonia, 84 mi. w.n.w. of Barcelona. As the key of Aragon and Catalonia it was early fortified, and still continues to be one of the most important military points in Spain. Pop. 17,672.

Lérins (lā-ran), THE, several small islands off the south coast of France. The largest, St. Marguerite, is occupied by a prison, especially famous as the residence for 12 years of the Man in the Iron Mask. The second, St. Honorat, contains the ruins of a once celebrated monastery.

Leros, a Turkish island in the Ægean, off the coast of Asia Minor, 35 mi. s. of Samos; length 6 mi., width 4 mi., pop. 3,000.

Le Sage (or Lesage) (lē-säzh), ALAIN RENÉ (1668–1747), French novelist and dramatic writer, b. at Sarzeau, in Brittany. He studied at the college of the Jesuits at Vannes, in 1692 went to Paris to study law, and in 1694 he married. To procure a livelihood he abandoned law for literature, his first attempts being in imitation of the Spanish drama. He subsequently translated Avellaneda's continuation of the *Adventures of Don Quixote*, and a comedy of *Calderon;* but his first success was with his *Crispin Rival de son Maitre. Le Diable Boiteux*, imitated from a Spanish romance, *El Diablo Cojuelo*, appeared the same year. In 1715 he published the first two volumes of *Gil Blas*, one of the best romances in the French language, the third volume appearing in 1724, the fourth in 1735. In 1732 he published *Les Adventures de Guzman d'Alfarache* (based on Aleman's work); and the following year *Les Adventures de Robert, dit le Chevalier de Beauchesne*, containing the real history of a freebooter, from papers furnished by his widow. In 1734 appeared *L'Histoire d'Estevanille Gonzales.* The last of his novels was *Le Bachilier de Salamanque* (1738).

Lesbos, a Greek island situated off the northwest coast of Asia Minor, now called *Mitylene*, from its capital. In shape it is nearly triangular, has an area of 276 sq. mi., and a pop. of about 40,000, and now belongs to Turkey. It is mountainous, but is exceedingly fertile, its principal products being figs, grapes, olive oil, and pine timber. The island formerly contained nine cities, the chief being Mitylene.

Lesghians, a Tartar people of the Mohammedan religion, inhabiting the Eastern Caucasus, and forming the chief portion of the inhabitants of Daghestan. They were among the most stubborn of the Caucasian peoples in their resistance to the Russians.

Les'ina (or Les'sina), an island in the Adriatic, on the coast of Dalmatia. Wine, olive oil, and fruit are produced. The principal town, bearing same name, is on the southwest coast, and has a good, natural harbor. Pop. 15,000.

Lesseps, FERDINAND, VICOMTE DE (1805–1894), French diplomatist and engineer. After holding several consular and diplomatic posts he retired from the government service, and in 1854 went to Egypt and proposed to the viceroy the cutting of a canal across the Isthmus of Suez. This great work was successfully completed in 1859–69, under his supervision, and brought him high honors of various kinds. He subsequently proposed several other grand schemes; but the only one really taken in hand has been the unfortunate Panama Canal.

Lessing, GOTTHOLD EPHRAIM (1729–1781), German critic, dramatist, and scholar, b. at Kamentz, in Upper Lusatia. He entered the University of Leipsic in 1746 to study theology, but his love of the drama and his intimacy with Schlegel, Mylius, Weisse, and other young men of literary tastes, led him to abandon this intention. After a short stay in Wittenberg he went, in 1748, with Mylius to Berlin, where he wrote for magazines and booksellers. He also undertook, with Mylius, a publication entitled *Contributions to the History and Improvement of the Theater;* published some poems under the title of *Trifles;* translated a work of the Spanish philosopher Huarte; and wrote some articles in *Voss's Gazette.* In 1755 appeared *Miss Sara Sampson*, a tragedy dealing with English life. In 1760 Lessing became secretary to General Tauenzien in Breslau for five years, when he returned to Berlin and published *Laocoon or On the Limits of Painting and Poetry.* About 1767 he became director of the National Theater at Hamburg. While here he wrote his *Dramaturgie.* His criticisms made him enemies, and having been compelled to quit Hamburg, the Duke of Brunswick appointed him his librarian at Wolfenbüttel. In 1775 he went to Vienna and accompanied Prince Leopold of Brunswick to Italy. He married in 1776, but his wife d. in little more than a year. At this period he was involved in fierce theological disputes, which his philosophical drama, *Nathan der Weise*, did nothing to allay.

Lestris, the genus of birds to which belong the arctic gull and the skua gull, the most formidable of all the gull kind.

Leth'argy, an unnatural tendency to sleep, closely connected with languor and debility, and much resembling apoplexy in character. It may arise from a plethoric habit, from deficient circulation in the brain, from nervous exhaustion of that organ, from a poisoned state of the blood, or from a suppression of urine.

Lethe (lē'thē) (Greek *lēthē*, forgetfulness), the River of Oblivion, one of the streams of the lower regions celebrated in ancient mythology, whose water had the power of making those who drank of it forget the whole of their former existence. Souls before passing into Elysium drank to forget their earthly sorrows; souls returning to the upper world drank to forget the pleasures of Elysium.

Letts, a Slavonic people closely akin to the Lithuanians, inhabiting a portion of Russia mainly comprised in Courland, Livonia, Vitebsk, and Kovno. Their language, along with the Lithuanian and Old Prussian (extinct), forms the Lettic or Lithuanian branch of the Indo-European family of tongues. The Letts number about 1,000,000.

Lettuce, a smooth, herbaceous, annual plant, containing a milky juice, and in general use as a salad. The stem grows to the height of about 2 ft., and bears small, pale yellow flowers; the inferior leaves are sessile, and undulate on the margin. The young plant only is eaten, as the lettuce is narcotic and poisonous when in flower. A number of species are known from various parts of the globe. *Lactucarium*, or lettuce opium, the inspissated juice of the lettuce, is used medicinally as an anodyne.

Leuca'dia (or Santa Maura), one of the Ionian Islands, on the west coast of Greece. The southwestern extremity, now Cape Ducato (also known as the Leucadian Rock, or the Lovers' Leap), is a white cliff rising to the height of at least 2,000 ft. On its summit was a temple of Apollo, in whose honor a criminal was annually thrown from the rock into the sea as a sin offering. Sappho, Artemisia, and other despairing lovers are said to have thrown themselves from it. Amaxichi is the chief town. Pop. of the island 20,737.

Leuchtenberg (loi*h*'ten-ber*h*), in the Middle Ages an independent landgraviate of Germany, which, by the extinction of the male line, fell to Bavaria in 1646. From it Eugène Beauharnais took the title of Duke of Leuchtenberg.

Leucocythæ'mia (Leucocythemia), in medicine, a disease in which the blood presents a great increase of the white corpuscles, the spleen and lymphatic glands being at the same time enlarged.

Leuco'jum (Leucoium), a genus of bulbous plants, natural order Amaryllidaceæ. They are very like snowdrops, but the six perianth segments are nearly equal. No varieties have been developed from this favorite plant by cultivation.

Leuctra, a village in Bœotia, on the road from Thespiæ to Platæa, famous for the victory of the Theban Epaminondas over the Spartan king Cleombrotus, which put an end to the Spartan domination in Greece (371 B.C.).

Levant', a term applied in the widest sense to all the regions eastward from Italy as far as the Euphrates and the Nile, and in a more contracted sense to the Asiatic coasts of the Mediterranean and the adjacent countries from Constantinople to Alexandria in Egypt.

Levee (Fr. *levée*), in America, an embankment on the margin of a river to confine it within its natural channel, such as may be seen on the banks of the lower Mississippi.

Level, an instrument by which to find or draw a straight line parallel to the plane of the horizon, and by this means to determine the true level or the difference of ascent or descent between several places for various purposes in architecture, agriculture, engineering, hydraulics, surveying, etc. There is a great variety of instruments for this purpose differently constructed and of different materials, according to the particular purposes to which they are applied, as the carpenter's level, mason's level, gunner's level, balance level, water level, mercurial level, spirit level, surveying level, etc. All such instruments, however, may be reduced to three classes: 1, Those in which the vertical line is determined by a suspended plumb line or balance weight, and the horizontal indicated by a line perpendicular to it. Such are the carpenter's and mason's levels. 2, Those which determine a horizontal line by the surface of a fluid at rest, as water and mercurial levels. 3, Those which point out the direction of a horizontal line by a bubble of air floating in a fluid contained in a glass tube. Such are spirit levels, which are by far the most convenient and accurate. All levels depend on the same principle, namely, the action of terrestrial gravity.

Leveling, the art or operation of ascertaining the different elevations of objects on the surface of the earth, or of finding how much any assigned point included in a survey is higher or lower than any other assigned point. In ordinary cases of leveling (for example, for canals, railways, etc.) the instruments commonly employed are a spirit level with a telescope attached to it, and a stand for mounting them on, and a pair of leveling staves. A *leveling staff* is an instrument used in conjunction with a spirit level and telescope. It is variously constructed but consists essentially of a graduate pole with a *vane* sliding upon it so as to mark the height at any particular distance above the ground. In leveling two of them are used together, and being set up at any required distance the surveyor, by means of a telescope placed between them perfectly horizontally, is enabled to compare the relative heights of the two places.

Lever, a bar of metal, wood, or other substance turning on a support called the *fulcrum* or *prop*, and used to overcome a certain resistance (called the *weight*) encountered at one part of the bar by means of a force (called the *power*) applied at another part. It is one of the mechanical powers, and is of three kinds, viz., 1, When the fulcrum is between the weight and the power, as in the handspike, crowbar, etc. In this case the parts of the lever on each side of the fulcrum are called the arms, and these arms may either be equal as in the balance, or unequal as in the steelyard. 2, When the weight is between the power and the fulcrum, as in rowing a boat, where the fulcrum is the water. 3, When the power is between the weight and the fulcrum, as in raising a ladder from the ground by applying the hands to one of the lower rounds, the fulcrum in this case being the foot of the ladder. The law which holds in the lever is: the power multiplied by its arm is equal to the weight multiplied by its arm. It is evident that when the power has a very large arm, and the weight a very small one, a very small power will overcome a great resistance. In the lever, as in all machines when a small force overcomes a

great one, the small force acts through a much greater distance than that through which the great force is overcome, or as is sometimes said, "What is gained in power is lost in time."

Le'ver, CHARLES JAMES (1806–1872), an Irish novelist. He graduated in arts at Trinity College, Dublin, in 1827, and in medicine in 1831, taking his doctor's degree a little later at Göttingen. He then returned to Ireland to practise. In March, 1834, he contributed his first paper to the newly started Dublin University *Magazine*, of which he became editor in 1842. The first chapter of *Harry Lorrequer* appeared in that magazine in 1837. Meanwhile he was attached as physician to the British legation at Brussels, where he practised for three years. During his three years' editorship of the Dublin University *Magazine* he resided in the neighborhood of the Irish capital, but after his resignation he took up residence on the Continent, mainly occupying himself with fiction. His *Charles O'Malley*, *Tom Burke*, *Jack Hinton*, etc., constituted a literature entirely *sui generis*. His later novels were more thoughtful and artistic. He obtained a diplomatic post at Florence about 1845, was appointed vice consul at Spezzia in 1858, and in 1867 at Trieste, where he died.

Leverrier, URBAIN JEAN JOSEPH (1811–1877), French astronomer. He devoted himself at first to chemical research, but some memoirs on the stability of the solar system drew on the attention of Arago, who induced him to persevere with astronomical studies. His observations on the transit of Mercury, in 1845, procured him admission into the Academy of Science. His great work was his investigation of the irregularities in the movements of the planet Uranus, carried on simultaneously but independently with those in the same line by John Couch Adams, which led to the discovery of the planet Neptune.

Levi, the third son of Jacob and Leah. The chief incident recorded of him, as apart from his brethren, is the part which he played in the massacre of the Shechemites. Three sons went down with him to Egypt—Gershon, Kohath, and Merari (Gen. 46:2). Moses and Aaron were of this tribe.

Levi'athan, a form of the Hebrew word *livyathan*, meaning a long-jointed monster, applied in Job 41 and elsewhere in the Scriptures to an aquatic animal variously held to be the crocodile, the whale, or some species of serpent.

Lev'irate (Lev'iration) (Lat. *levir*, a husband's brother), the custom among the Jews of a man's marrying the widow of a brother who died without issue. The same custom or law prevails in some parts of India.

Levis, Levis co., province of Quebec. Railroads: Intercolonial, Quebec Central, Grand Trunk, Boston & Maine, and Maine Central. Ferry boats between Levis and Quebec. Industries: machine shops, iron foundry, boot and shoe, cigar, wood, soap, woolen, and other factories, and lumber mills. Surrounding country agricultural. First settled in 1647 and became a city in 1861. Pop. est. 1897, about 8,200.

Le'vites, the name generally employed to designate not the whole Jewish tribe that traced its descent from Levi, but a division within the tribe itself, in contradistinction to the priests, who are otherwise called the "sons of Aaron." They were the ministers of worship, especially singled out for the service of the sanctuary. Together with the priests they formed the sacerdotal tribe. A permanent organization was made for their maintenance. In place of territorial possessions they were to receive tithes of the produce of the land, and in their turn to offer a tithe to the priests. After the settlement in Canaan, to the tribe of Levi were assigned forty-eight cities, six of which were cities of refuge, thirteen of the total number being set apart for the priests. To the Levites was to belong the office of preserving, transcribing, and interpreting the law, and they were to read it every seventh year at the feast of tabernacles. Their position was much changed by the revolt of the ten tribes, and they are seldom mentioned in the New Testament, where they appear as the types of formal, heartless worship.

Levit'icus, the name of the third book of the Pentateuch, so called from the first word of its contents. By the later Jews it was called the "Law of the Priests," and sometimes the "Law of Offerings." It consists of seven principal sections, but it may be generally described as containing the laws and ordinances relating to Levites, priests, and sacrifices.

Levoglu'cose (Lævoglucose), a sugar isomeric with dextroglucose, but distinguished from it by turning the plane of polarization to the left, and always occurring along with it in honey, in many fruits, and in other saccharif erous vegetable organs.

Lewes (lö'es), a municipal borough of England, in Sussex, on the Ouse, 7 mi. n.e. by e. of Brighton. It is built on an acclivity, and is a place of great antiquity, containing the ruins of many ecclesiastical buildings. The chief manufacture is agricultural implements. In its vicinity, in 1264, the barons, under Simon de Montfort, defeated the royal army under Henry III. Pop. 1891, 10,997.

Lewes (lö'es), GEORGE HENRY (1817–1878), philosophical writer and contributor to most departments of literature, b. in London. His first important work was his *Biographical History of Philosophy from Thales to Comte*, originally published in 1845, and subsequently much extended and altered — a work written more or less from a Positivist point of view, and sufficiently proving his ability as a thinker and writer. From 1849 to 1854 he was literary editor of the *Leader*, during that time publishing his *Life of Robespierre* (1850) and a compendium of *Comte's Philosophy of the Sciences* (1853). His *Life of Goethe*, which won him a European reputation, was published in 1855. From 1854 he was largely engaged in physiological investigations with special reference to philosophical problems. To this period belong his *Seaside Studies* (1858), *Physiology of Common Life* (1860), and *Studies in Animal Life* (1861), besides papers contributed to the British Asso-

ciation on the spinal chord and on the nervous system. In 1864 he published a study on Aristotle, and in 1865 founded the *Fortnightly Review*, but was compelled by ill health to retire a year later. The chief work of his life, aiming at the systematic development of his philosophical views, is entitled *Problems of Life and Mind* (1873–77).

Lewis (lō'is) the largest of the Hebrides, Scotland; area 700,000 acres. The Gælic language is almost universally spoken. The principal town is Stornoway. Pop. of entire island, 28,339.

Lewis River (or Snake River), a river of North America, which rises in the Rocky Mountains and runs n. w. into the Columbia, 413 mi. from its mouth; length about 900 mi. Its course lies partly in Idaho, partly between Idaho and Oregon, and partly in Washington.

Lewiston, Androscoggin co., Me., on Androscoggin River. Railroads: Grand Trunk; Maine Central; Rumford Falls & Portland. Industries: large cotton mills, machine co., belting and leather co., planing and molding mill, sash, hat, broom, and other factories, and pork packing. Surrounding country agricultural. The town was first settled in 1770, and became a city in 1865. Pop. 1900, 23,762.

Lexington, Middlesex co., Mass., 11 mi. n.w. of Boston. Railroad, Boston & Maine. Industry, agriculture. The first battle of the Revolutionary War was fought at Lexington, April 19, 1775, when a small band of minute men opposed the advance guard of the British forces on their way to seize some supplies at Concord. Pop. 1900, 3,831.

Lexington, county seat of Fayette co., Ky., 98 m. s. of Cincinnati, O.; on the Ches. & O., the Lexington & Eastern, the L. & N., the Southern and the Queen & Crescent Route. It lies in the famous "blue grass region" and is the market for the grain, blue-grass seed, horses, cattle, hemp and tobacco of that section. It is celebrated for the manufacture of whiskey. Other manufactures are flour, cigars, saddlery and harness, and planing-mill, foundry and machine-shop products. The city is the seat of the State Asylum for the Insane, Kentucky Reform School, Kentucky University, State Agricultural and Mechanical College, Sayre Female Institute, St. Catherine's Academy and Hamilton and McClelland College. In the vicinity are the race-tracks and several noted stock farms. From 1792 to 1793, Lexington was the capital of Kentucky. It was the home of Henry Clay for many years. Pop. 1900, 26,369.

Leyden (Lat. *Lugdunum Batavorum*), a town in Holland, 22 mi. s.w. of Amsterdam. Leyden is encompassed by windmills. The most important educational institution is the university, formerly one of the most famed in Europe. It is attended on the average by about 700 students, nearly one half studying law. Leyden has cloth and other manufactures. The Pilgrims started hence to found the colony at Plymouth, Mass. Pop. 44,630.

Leyden Jar, an early form of electric accumulator, introduced to the scientific world by Muschenbroek of Leyden in 1746, hence its name. It consists of a glass phial or jar coated inside and outside, usually with tin-foil, to within a third of the top. A metallic rod, having a knob at the top, is fixed into the mouth of the jar, and is made to communicate with the inside coating, and when the jar is to be charged the knob of this rod is applied to the prime conductor of an electric machine. As the electric fluid passes to the inside of the jar an equal quantity passes from the outside, so that the two coatings are brought into opposite states, the inside being positive and the outside negative. The jar is discharged by establishing a communication between the outside coating and the knob. When a number of jars are placed in a box lined with tin-foil connected with the earth, their knobs being joined together, they form a *battery;* a quantity of electricity equal to the sum of the charges which would be received by each jar can be collected in such a battery, capable of melting fine metallic wires, puncturing plates of glass or cardboard, killing animals, and rupturing bad conductors.

Lia-fail (or Stone of Destiny), a broad, gray stone on which the kings of Scotland were crowned in the Abbey church of Scone. In 1296 Edward I carried it to England, and it still remains under the coronation chair in Westminster Abbey.

Lian'as, a term applied to those climbing and twining plants found in profusion in tropical climates, where in many instances they overtop the heads of the tallest trees, and intertwine the entire forest by their cable-like shoots, forming an impenetrable network, which it is necessary to break through with the hatchet. Vanilla, sarsaparilla, and other medicinal plants are true lianas.

Lias, in geology, the name given to that series of strata, consisting principally of thin layers of limestone imbedded in thick masses of blue clay, lying at the base of the Oolitic or Jurassic series, and above the Triassic or New Red Sandstone. Fossil remains are abundant. See *Geology.*

Libau (lē'bou), an important seaport of Russia, government of Courland, at the mouth of the lake of the same name, on the Baltic. Its trade in corn, flax, hemp, etc., is considerable. Pop. 27,418.

Libel, in law, the act of publishing malicious statements with the intent to expose persons or institutions to public hatred, contempt, or ridicule, and thereby provoking them to anger, causing a breach of the peace, injury to reputation, business, etc. The difference between libel and slander is, that in the former case the defamation must have been effected in writing, printing, or in some other visible manner, while in the latter the offense is committed verbally. Publication is held to have taken place if the libel is seen but by one person other than the person libeled. The law distinguishes defamatory, seditious, and obscene libel. A defamatory libel may result in civil and criminal proceedings against both the publisher and the writer, but to come un-

der this category it is essential that the libel be false, malicious (the law presuming malice in every injury done intentionally and without justification), have a tendency to provoke hatred or contempt, and that it be non-privileged. In criminal law it is a misdemeanor to publish or threaten to publish a libel; or as a means of extortion, to offer to abstain from or to prevent others from publishing a libel. In the U. S. the punishment for this offense is imprisonment fixed by statute in the different states. A seditious libel is one directed against the head of the state, the legislature, the courts of justice, etc., and its publication constitutes also a misdemeanor. The term "obscene libel" comprises any obscene publication, and the publisher thereof is liable to imprisonment with hard labor. If the charges contained in the libel are true a civil action cannot be maintained, but the truth of the libelous matter is no defense at common law; at the same time it generally secures the defendant the merciful consideration of the court. In a civil action the plaintiff recovers damages, the amount of which is settled by the jury; upon an indictment the jury has merely to acquit the defendant or to find him guilty, after which the court passes judgment, and awards punishment, generally fine or imprisonment, or both. Recent legislation and decisions in this branch of law in Great Britain and the U. S. (the American laws differ but little from those of Great Britain) have a tendency to limit liability for action to purely false, scandalous, and malicious libels. Truth, if published with good motives and for justifiable ends, is now admitted as a good defense, and even motive alone, though the statements may prove untrue.

Liberal Party, in politics, the party which claims to be distinctively that of reform and progress. The main objects of liberal agitation and legislation are to vest increased power in the people and to extend privileges to the masses, which were formerly monopolized by the favored classes. Most European countries have a powerful liberal party and liberalism is rapidly spreading in Europe, particularly in Great Britain, Germany, Italy, Spain, Holland, Norway, and Sweden. In Great Britain Liberal and Conservative ministries follow each other at irregular intervals, and on the whole the system works well. In proportion to population, the Liberal party is strongest in Scotland and Wales. The greatest of modern Liberal leaders is the Right Hon. W. E. Gladstone, but his introduction, in 1886, of the Irish Home Rule and Land Purchase bills alienated some of his most able supporters, and led to the formation of the Liberal Unionist Party.

Liberal Unionist Party, in British politics, a party formed in the summer of 1886 by Liberals (under the leadership of the Marquis of Hartington), who objected to Mr. Gladstone's Irish Government and Land Purchase bills, as being destructive of the integrity of the United Kingdom, and dangerous to the empire. They gained their immediate object by coalescing with the Conservatives, and in the election which followed the defeat of the Gladstonian ministry they succeeded in returning some 80 members to Parliament. They have since acted with the Conservatives.

Libe'ria, a negro republic on the west coast of Africa, founded in 1820 by liberated American slaves under the auspices of the American Colonization Society, and recognized as an independent state in 1847. The soil is fertile, well watered, and highly adapted to the cultivation of all tropical products. The chief crop is coffee, increasing quantities of which are grown from year to year and exported, other exports being palm oil, groundnuts, caoutchouc, and ivory. Population, 1901, is 2,060,000, of which about 20,000 came from the U. S. Area 35.000 square miles. Capital, Monrovia.

Liberty Bell, the bell originally hanging in Independence Hall, Philadelphia, and which first pealed forth the news of the signing of the Declaration of Independence. It has always been an object of intense and patriotic interest. It was shown at the World's Fair, Chicago, and at several subsequent expositions.

Liberty, Cap of, a cap used as a symbol of liberty. In ancient times Roman manumitted slaves put on what was termed the Phrygian cap, in token of their freedom. In modern times the name cap of liberty was given to a red cap worn by French revolutionaries.

Library, the name given to a collection of books, and to the building in which it is located. Libraries existed in ancient Egypt and Assyria, and Pisistratus is credited with the honor of introducing a public library at Athens about B.C. 337. Cicero and various wealthy Romans made collections of books, and several Roman emperors established libraries, partly with books obtained as spoils of war. By far the most celebrated library of antiquity was the Alexandrian. In the West libraries of any note were founded in the second half of the eighth century by the encouragement of Charlemagne. In France one of the most celebrated was that in the abbey St. Germain des Prés, near Paris. In Germany, the libraries of Fulda, Corvey, and in the eleventh century, that of Hirschau, were valuable. In Spain, in the twelfth century, the Moors had seventy public libraries of which that of Cordova contained 250,000 volumes. In Britain and Italy libraries were also founded with great zeal, particularly in the former country, by Richard Aungerville; in the latter by Petrarch, Boccaccio, and others. After the invention of the art of printing this was done more easily and at less expense. The principal libraries of modern times are the national library at Paris, with nearly 2,300,000 books and 10,000 MSS., and the British Museum library, London, with over 1,500,000 books and 100,000 MSS. The central court library at Munich, the imperial library at St. Petersburg, and the royal library at Berlin have each over a million volumes and thousands of MSS. Other large and valuable libraries are the imperial library at Vienna; the royal libraries at Stuttgart, Dresden, and Copenhagen; the university libraries of Genoa, Prague, Göttingen, Upsala, Oxford, Cambridge,

and Dublin; also the libraries of Moscow, Venice, Florence, Milan, Bologna, Naples, and the Advocates', Edinburgh. The Vatican library, Rome, and the Bodleian, Oxford, are particularly valuable in rare books and MSS. The spread of education has called into existence innumerable smaller libraries, ready of access, and providing such literature as the special class of readers demand. This public library system has naturally been most developed in highly educated countries such as Germany, France, Great Britain, and the U. S. The Bureau of Education of the U. S. records nearly 6,000 libraries with over 20,000,000 volumes. The public library of Boston has over half a million books, while the libraries of Harvard University, Cambridge, Yale College, New Haven, the Astor library, and Mercantile Library Association, New York, and the Congress library, Washington, possess each several hundred thousand volumes; the latter alone numbering 643,000, besides 200,000 pamphlets. In the U. S. there are now 1,686 public libraries, with over 13,000,000 volumes. The Drexel Institute of Philadelphia is the most recent, as it is the greatest endowment which includes a library as an important part of its splendid educational courses. Mr. Andrew Carnegie has given $1,000,000 for the Pittsburg library, $1,000,000 for Pittsburg Art Gallery and Museum, $300,000 for the Allegheny City library, $100,000 for the Carnegie library at Braddock, $40,000 for the Johnstown library; besides benefactions for Edinburgh, Dunfermline, Ayr, and other Scotch towns.

License, in law, the grant of permission to do some lawful act, also the document conferring such authority. All civilized countries require that persons should not carry on certain trades or professions, or do certain acts, without previous grant of license, and such licenses may be imposed for the sake of regulating traffic or raising revenue. Most numerous are licenses issued to empower persons to sell certain articles. The license laws vary in the different states. Some of the states have adopted Local Option, and several (notably Maine) have entirely prohibited the sale of intoxicants as a beverage; while others have imposed an almost restrictive license duty. In Canada an act for the licensing of places for the sale of liquor came into operation in 1884. By it boards of licensing commissioners are established all over the country, and the number of hotel and saloon licenses to be granted in any locality is determined by the population.

Lichens, a very extensive order of cryptogamic or flowerless plants. According to a modern theory lichens are not simple plants, but are fungi parasitic on algæ, the two being mutually dependent. They have neither stem nor leaves, but consist mainly of a *thallus* deriving its nourishment from the air. They are reproduced by spores contained in fruits called *apothecia*, which are regarded as the fungi or the particular lichen. They are common everywhere, commonly in the form of flat crusts, sometimes of foliaceous expansions, adhering to rocks, the trunks of trees, barren soil, etc. They are found flourishing to the very verge of perpetual snow, and one species, the reindeer moss, grows in the greatest profusion in the Arctic regions, where it forms the reindeer's chief sustenance. The Iceland moss is also abundant in the Arctic regions, and often affords aliment to the inhabitants. Several other lichens afford dyes of various colors, these being chiefly obtained from rocks in the Azores and Canaries. Litmus is also obtained from a lichen.

A Fruticose Lichen.

Lich Gate (literally "corpse gate"), in architecture, a sort of open shed or covered gateway at the entrance of a churchyard, beneath which the bearers of the coffin awaited the arrival of the priest, who there commenced to read the burial service, and thence walked before the mourners to the grave.

Lick, James (1796–1876), philanthropist, was b. in Fredricksburg, Pa. In 1847 he settled in California, accumulating a large fortune. Besides other charitable bequests, he donated $540,000 for a school of mechanical arts, and $700,000 to construct an observatory which was to contain an equatorial telescope, the largest in the world. The observatory is supplied with instruments of the most perfect kind, and in particular possesses a refracting telescope with an object glass 36 in. in diameter.

Lictors, in Rome, were the public servants who attended upon the chief magistrates, consuls, prætors, etc., to clear the way for them, and cause due respect to be paid to them. They carried axes tied up in bundles of rods, called *fasces*, as ensigns of office, and were selected from the lower class of free men. The number of lictors preceding the state dignitaries depended upon the rank of the latter.

Liebig (lē-bi*h*), Justus, Baron von (1803–1873), one of the most eminent of modern chemists, b. at Darmstadt. At the age of sixteen he entered the University of Bonn, and afterwards that of Erlangen, where, in 1822, he gained the degree of Doctor of Philosophy (physical and mathematical sciences). He first secured the attention of the chemical world in 1824 by reading a paper before the French Academy of Sciences on fulmic acid and the fulminates, the true composition of which was until then unknown. This also

gained him the favor of Humboldt, and through the latter's influence he was appointed, in 1825, ordinary professor of chemistry at the University of Giessen, a chair he held for 25 years. In 1850 he replaced Professor Gmelin at Heidelberg, and in 1852 he accepted the chemistry chair at Munich, with charge of the laboratory. The Munich Academy of Sciences elected him president in 1860. The results of Liebig's labors were generally given in the scientific reviews of the time, but chiefly in his own organ, *The Annalen der Pharmacie* in the *Transactions of the Royal Society of London*, and the *Mémoires de l'Academie des Sciences*. Liebig is regarded as the founder of organic chemistry, owing to the many discoveries he made in this department. He did much to improve the methods of analysis; his *Chemistry of Food* has brought about a more rational mode of cooking and use of food; while agriculture owes much to his application of chemistry to soils and manures. The grand-duke of Hesse created him a hereditary baron, and he received many honors from universities and learned societies of Europe and America.

Liége (li-āzh) (Flem. *Luik*, Germ. *Lüttich*), a town of Belgium, capital of the province of same name, 54 mi. s.e. of Brussels. It dates from the sixth century, was once strongly fortified, and still has a citadel and another fort. Liége is the principal manufacturing town of Belgium, its foundries, firearm, metal, and tool manufactures being very extensive; besides these there are important woolen mills, tanneries, and printing offices. Pop. 137,559.

Liegnitz (lēḥ'nits), a town of Prussia, in the province of Silesia, 40 mi. w.n.w. of Breslau. Its manufactures include machinery and hardware, pianos, gloves, woolens, cottons and linens, hosiery, etc. Pop. 37,157.

Li'en, in law, in its most usual acceptation, signifies "the right which one person, in certain cases, possesses of detaining property placed in his possession belonging to another, until some demand the former has is satisfied." In the U. S. liens are of two kinds: 1, *specific liens*, where the person in possession of goods may detain them until a claim, which accrues to him from those *identical* goods, is satisfied; 2, *general liens*, where the person in possession may detain the goods, not only for his claim accruing from them, but also for the general balance of his account with the owners.

Lifeboat, a boat for saving persons from shipwreck. The first lifeboat was patented in Great Britain by Lukin in 1785, but Henry Greathead introduced an improved form in 1789 which proved very successful, and till 1851 was almost the only one in use. The Life-saving Service of the U. S. is supported by government funds, and the Atlantic and some of the lake coasts are now studded with life-savings stations, provided with suitable boats, appliances, and houses of refuge for the saved. At the close of 1900 there were 268 life-saving stations in the United States, of which 194 were on the Atlantic coast, 58 on the Great Lakes. The cost of maintaining the service was $1,535,987, and 2,655 were rescued

Life Buoys, Life Rafts, etc.—Various kinds of buoys or other apparatus for the preservation of human life in cases of shipwreck or danger from drowning in other circumstances have been introduced from time to time, constructed in all sorts of shapes and materials. India rubber has been largely used in the construction of life-buoys, generally in the form of belts which can be easily inflated by the wearer in the course of a few seconds. They are very buoyant and portable, but easily punctured or torn, and soon decay if put aside while damp. Hence the interior has come to be divided into cells, so that the rupture of one effects only a partial damage. Another sort is in the form of a waistcoat; and inflated pillows and mattresses made on the same principle have been found very effective. Naval officers have also strongly recommended mattresses stuffed with cork. The life-buoy most favored by seamen of late years is composed of slices of cork so neatly arranged that they form a buoyant zone about 32 in. in diameter, 6 in. wide, and 4 in. thick. It contains about 12 lbs. of cork, is compactly covered with painted canvas to protect it from being injured by the water, and furnished with looped life-lines, that several, if necessary, may at once have a convenient hold. Various new life-saving suits have been shown at recent exhibitions.

Life Rockets, projectiles by means of which a rope is thrown either from a ship in distress to the shore, or from the shore to the ship, generally the latter. The most reliable missiles are those that are discharged from a mortar or gun by gunpowder, having a line attached to them. The *life-mortar* of Captain Manby, invented in 1807, is practically still that in use, though variations in details have been made on it from time to time. His missile was a shot with curved barbs, resembling the flukes of an anchor, to grapple the rigging or the bulwarks of a ship. In the U. S. the management of the life rocket apparatus is under the control of the life-saving service. The stations surround all parts of the Atlantic and lake coasts, presided over by a general superintendent, with headquarters at Washington. They are supported by appropriations made by Congress. On the Atlantic beaches the stations are located five miles apart.

Ligament, in anatomy the strong, tendinous, inelastic, white bodies which surround the joints, and connect bones, or strengthen the attachments of various organs, or keep them together. Every joint is surrounded by a capsular ligament; the tendons at the wrist and ankle are bound down by what are called the annular ligaments. In dislocation of joints the capsular ligament is often broken.

Light, the agent which enables us through the organ of sight to take cognizance of objects; it has a heating and chemical action which is all-important to animals and plants; without it there would probably be neither animal nor plant life. The sun, the fixed stars, nebulæ, certain meteors, and terrestrial bodies in a state of incandescence or phosphorescence

are self-luminous. The origin of light has been explained by two main theories, the *emission* or *corpuscular* theory, and developed by Newton, and the *undulatory* or *wave* theory, the fundamental principles of which were laid down by Huygens and Euler. Newton held that the sun and other light-giving bodies threw off, with immense velocity, vast numbers of infinitely minute particles of matter, which passed into space, and by their mechanical action upon the eye brought about the sensation of light. Numbers of distinguished men accepted this theory, and many of the phenomena of light were plausibly explained by it. Huygens suggested that light was due to some sort of wave motion transmitted through a medium. His theory, offered toward the end of the seventeenth century, made little progress until the beginning of the present century, when its truth was amply established by the labors of Young, Fresnel, and others; and it is now universally accepted. Rays of light proceed in straight lines, and when a screen is removed to twice or three times its distance from a luminous point it receives only one fourth or one ninth of light per unit of area which it received formerly. This is the law of inverse squares, or—the intensity of the light received from a luminous point is inversely proportional to the square of the distance from the point. Advantage is taken of this fact in determining the relative illuminating powers of two sources of light by means of the photometer. In 1676 Rœmer discovered that light is not instantaneously propagated from luminous bodies to the eye; and he calculated its velocity. Bradley, Foucault, Fizeau, Cornu, etc., made similar measurements, and it has been determined that light travels at the rate of about 186,000 mi. per second.

When light falls upon the surface of a body part of it is reflected. When the surface is smooth and regular an eye placed to receive the reflected rays generally observes an image of the source of light, and the surface may be called a mirror. When it is not smooth the light which falls upon it is scattered in all directions, so that the surface itself becomes visible; planets and nearly all terrestrial objects become visible in this way by means of reflected solar light. While part of the light which falls upon the surface of a body is reflected part enters into the body, which absorbs or destroys a certain amount of it, and may allow the rest to pass through. When light falls nearly vertically on a glass surface very little of it is reflected, but as the incidence becomes more and more oblique a greater and greater proportion of the light is reflected. Polished metals, particularly silver, are good reflectors of light at all incidences, and hence metallic surfaces are most commonly used as mirrors. The law of reflection was known to Archimedes; it is, The incident and reflected rays make equal angles with a perpendicular to the surface, and lie in the same plane with it. When a ray has passed obliquely from air into water, although in the water as in the air it is a straight line, this is not a mere continuation of its old path; it is bent to some extent at the point where it enters the new medium, the bending of the ray being called *refraction.* This bending of a ray when it passes from one medium, such as air, into another homogeneous medium, such as glass or water, or from air into denser air, is subject to a particular law. The law of refraction was discovered in the seventeenth century; it is, Whatever be the obliquity of a ray passing from one medium to another, the sines of the angles made by the incident and refracted rays with the perpendicular to the refracting surface are in a constant ratio, which has been called the *index of refraction.* When a ray of light passes through a medium, such as the atmosphere, which continuously varies in density from place to place, its direction continuously changes, so that it is a curved line, a fact to which the phenomenon of the mirage is due. The application of mathematics to the two laws of reflection and refraction is called *optics;* this science includes the formation of images by mirrors and lenses, the eye, microscopes, telescopes, etc.

Newton found that red light is not so much refracted as blue light when it passes from one medium to another. When a ray of solar light is refracted in passing through a glass prism he found that a great number of rays of different colors left the prism, the blue ray being most bent from its former path, and the red ray least. Letting these rays fall upon a screen he obtained a band of colors which he called a spectrum. Thus he had decomposed solar light and found it to consist of a mixture of lights of every gradation of refrangibility. On permitting all the colored rays to pass through a lens before falling on the screen they combined and became white light again. Newton failed to observe one peculiar feature of the spectrum which has since been studied, and has led to important results—namely, that it was not really continuous, but was crossed by a number of dark lines. From this has arisen the instrument called the *spectroscope* and the branch of physics called *spectrum analysis.*

In Newton's experiment with solar light and the prism we find that the blue and green rays very slightly affect a thermometer, the yellow rays affect it slightly, and the extreme red rays possess great heating properties; moreover, when the thermometer is passed beyond the red into a space in which there are no luminous rays a maximum heating effect is produced. Again, the red and yellow rays are all but incapable of blackening photographic paper, whereas the blue and violet rays exert a rapid chemical action, and this is even exceeded by the invisible rays beyond the violet. It is evident then that 1, some of the solar rays which pass through the prism do not affect the retina; these rays are either less refrangible than red light, or are more refrangible than violet; 2, the least refrangible solar rays possess most heating power; 3, the most refrangible rays are capable of exerting the most powerful chemical action. As glass prisms absorb many of the heat rays it is convenient to use

prisms of rock salt in examining the heat (red) end of the spectrum.

Young showed that two rays of light may destroy each other's effects and produce darkness. He applied the discovery to the explanation of many natural phenomena, such as the colors in mother-of-pearl, on soap bubbles, etc. It has also been shown that rays of light may bend round obstacles. When a ray of light enters Iceland spar it divides into two rays which travel in different directions; these two rays possess peculiar properties which are not exhibited by ordinary rays of light, and are said to be *polarized*. These polarized rays cannot be made to interfere or destroy each other's effects, but either of them may be divided into two interfering rays. These and other allied phenomena are accepted by physicists as proofs that 1, there exists throughout all space a very elastic medium of small density, known as the *ether;* 2, the particles of all bodies are in a state of vibration; a rise in temperature of a body indicates an increase in the rapidity of vibration of its particles; 3, radiation of heat consists in the communication of these vibrations from the particles of a body by the ether to all parts of space; 4, when these vibrations communicated by the ether become rapid enough they are able to affect the retina of the eye and are then called light; 5, lights differ in color when their vibrations are not executed in equal times; 6, the vibrations of particles of the ether are all executed at right angles to the direction of propagation of the light; 7, in a ray of polarized light the vibrations are all executed at right angles to a certain plane called the plane of polarization; 8, the planes of polarization of the two rays in Iceland spar mentioned above are at right angles to one another.

Light, Artificial, any kind of illuminant for supplementing the light of the sun. Some form of artificial light must have been in use for domestic purposes from the very earliest times, but though large cities and a high state of civilization existed among the Egyptians, Greeks, and Romans, the systematic lighting of streets was unknown to them.

Lighthouse, a tower or other lofty structure with a powerful light at top, erected at the entrance of a port or on some rock or headland, and serving as a guide or warning of danger to navigators at night. The Pharos of Alexandria, founded about 300 B.C., is the earliest building erected expressly as a lighthouse of which we have any authentic record. It is stated to have been 550 ft. high. In modern times the first important lighthouse erected was the Tour de Cordouan, at the mouth of the Garonne in France, founded in 1584 and completed in 1610, altered and improved in 1727. It is 197 ft. in height, and the architecture surpasses all other lighthouses in the world. In the U. S. the lighthouses are under the Lighthouse Board, which has charge of all buoys, beacons, etc., on the coasts and waters of the states. The earlier lights were simply of wood, and later fires of coal exposed in open chauffers upon the top of a tower. When oil was first introduced as an illuminant is not known. An immense improvement in lighting was made a few years previous to the French Revolution by the introduction of parabolic reflectors, which concentrate and throw forward in a horizontal direction the rays of light proceeding from lamps placed in their foci. At the same time the revolving frame carrying the lamps and reflectors was introduced, which has proved of the greatest utility in establishing a distinction between lights. The reflectors are composed of sheet-copper plated with silver, and formed into a parabolic curve by a laborious and delicate process. This mode of lighting is termed the *catoptric* or *reflecting* system, and was rapidly adopted in Britain after its first employment in France. It is so called in opposition to the *dioptric* or *refracting* system, in which the illumination is produced by a central lamp, the rays from which are transmitted through a combination of lenses by which it is surrounded. The adoption of lenses in lighthouses, though suggested as far back as the middle of the last century, was first carried into practical effect in 1788 by M. Augustin Fresnel, a distinguished French savant. The superior advantages which this system has been found to possess over that of reflectors has led to its general adoption in most lighthouses. Fresnel likewise contrived a combination of the two systems, the apparatus in which consists of thirteen rings of glass of various diameters, arranged one above another in an oval form. The five middle rings form a cylindric lens through which the rays from the central lamp are transmitted by *refraction*, while the other rings or prisms, five of which are upper and three lower, are constructed in such a manner as to project by *reflection* the light from the focus in a direction parallel with the refracted rays. The light thus obtained is termed the *catadioptric* light.

Various modes of exhibiting the light have been introduced so as to establish a distinction between different lighthouses; *Rev.* (*revolving*), the light gradually increasing to full effect and gradually decreasing to eclipse at equal intervals; *Int.* (*intermittent*), suddenly appearing in view, remaining visible for a certain time and then as suddenly eclipsed for a shorter time; *Alt.* (*alternate,*) red and white lights at equal intervals without any intervening eclipse. A system of alternate flashes and eclipses (somewhat similar to the dot and dash of the Morse alphabet) has been proposed as an easy means of recognition of particular lights.

Oil, particularly paraffin, is commonly employed at present, and it is likely to remain in use in isolated lighthouses. Gas has been substituted for oil in some lighthouses; with gas an eclipse can be simply produced by a partial stoppage in the supply pipes, and there is no such waste of light as when oil is employed. The electric light has been adopted for a number of lighthouses, and recent experiments prove it to be the most powerful and penetrative of all lights; there are, however, still some drawbacks to its general applica-

tion, and some authorities report against it as a lighthouse illuminant.

Lightning, a flash of lightning resulting from a sudden discharge of atmospheric electricity. It may be a diffused reddish white or violet flash, seemingly spread over a considerable extent of the sky, or a zigzag or rather sinuous line of very brilliant light, resulting from a discharge between two clouds or between a cloud and the earth. *Heat* or *sheet lightning* is unaccompanied by thunder; it is now generally held to be the reflection from aqueous vapor and clouds of a discharge occurring beyond the horizon. Sometimes during a thunder storm *fireballs* are seen, but no exact observations of them have yet been made. Experiments show that the duration of a flash of lightning is inconceivably small, in some instances not more than a millionth part of a second. The *spectrum* of lightning shows the presence of incandescent nitrogen, oxygen, hydrogen, and sodium. Certain electroscopic experiments seem to show that previous to a discharge between two clouds internal discharges are taking place in both. Lightning in passing through air and non-conductors,

Photograph of Lightning.

metallic rods, etc., exhibits all the phenomena of the passage of a very great quantity of electricity; it kills animals, splits trees and stones, and melts thin wires. Sometimes on entering the earth the lightning melts the siliceous substances in its way, producing the tubes called *fulgurites.* After a lightning discharge the peculiar odor of ozone may be observed, as in the neighborhood of an electric machine. Objects at a distance from a place of discharge may have been previously charged with electricity by the induction of the clouds; the distant discharge suddenly sets free this electricity so that it passes through the objects to the ground, producing a *return shock;* men and animals have often been killed in this way. *Thunder* is due to the sudden disturbance of the air produced by a lightning discharge; the long rolling effect is perhaps due to echoes from the clouds, perhaps partly to there being a number of discharges at different distances from the observer. Sound travels at ordinary temperatures about 1,100 ft. per second, so that a thunder-clap from a distance of one mile would reach us in about five seconds.

Lightship (or Lightboat), a vessel, usually single-masted, serving as a lighthouse in positions where a fixed structure is impracticable. Octagonal lanterns, fitted with argand lamps placed in the foci of parabolic reflectors, are usually hoisted on the mast.

Lignine, a modification of cellulose (q. v.).

Lignite (or Brown Coal), compressed and altered vegetable matter intermediate in its qualities between peat and coal. It occurs chiefly in the tertiary strata in many European countries, occasionally in thick beds, as in Germany and France, and is to some extent used as fuel.

Lig'ula (Lig'ule), in botany, a strap-shaped petal of flowers of the order Compositæ; also the membrane which occurs at the base of the lamina of a grass leaf, as that of millet. Hence the term *ligulate,* applied especially to the ray florets of Compositæ.

Ligu'ria, one of the larger divisions (compartimenti) of Italy; area 2,055 sq. mi.; pop. 930,609. It includes the towns of Genoa, Spezzia, and St. Remo, and is the most important maritime division.

Lig'urite, a variety of sphene, a mineral occurring in oblique rhombic prisms, of an apple green color, occasionally speckled externally; so called on account of its being chiefly found in Liguria. Its color, hardness, and transparency have caused it to be classed as a gem.

Li Hung Chang, Earl (1822–1901), a viceroy of China and highest ranking officer of the empire. In 1861 Li was appointed governor of the province of Kangsu, and in conjunction with General Gordon put down the Taiping rebellion, and was made governor general of the Tiang-Kiang provinces. He was viceroy of Pi-Chi-Li and Senior Grand Secretary of State from 1870 to 1894. Earl Li was commander of the Chinese forces during the war with Japan, and negotiated the treaty of peace. In 1896 he represented his government at the coronation of the Czar, and visited the United States. In 1899 he was decorated with the Double Dragon, an unusual honor, and in 1900 was appointed with Prince Ching to negotiate a treaty with the foreign powers operating in China. He died Nov. 7, 1901. Li Hung Chang was one of the foremost diplomats and statesmen of his age, and managed the affairs of his country with consummate skill. He was a friend of Western culture, and to him is due much of China's progress. Pl. 18, Vol. II.

Lille (lēl), a town of France, capital of the department Nord, and chief fortress of the northeast of France, near the Belgian frontier. The manufacture of linen and cotton thread and fabrics are the most important, but fine woolen cloth, velvets, and carpets are also largely produced; in fact, the factories of Lille cover almost the whole range of textile goods. Chemicals, leather, machinery, paper, beet sugar, etc., are also turned out in ever-increasing quantities. Pop. 201,211.

Lily, a genus of plants, natural order Liliaceæ. The root is a scaly bulb; the leaves simple, scattered, or verticillate; the stem herbaceous, simple, and bearing at the summit very large and elegantly formed flowers. The flower consists of six petaloid sepals, the calyx and corolla being alike in form and color. There are many species, those best known in Europe being the white, orange, and scarlet lilies, the tiger lily, etc. The common white lily is a native of Syria, Persia, and other East-

a.—Orange Lily; *b.*—Turk's Lily.

ern countries. The finest American species is the *L. superbum*, which grows in marshes to the height of 6 or 8 ft. bearing reflexed orange flowers spotted with black. A well-known Japanese lily is one of the noblest flowering plants in existence, and highly fragrant. *L. giganteum* grows to the height of 12 ft. In the Middle Ages and in modern times the white lily has been the emblem of chastity, hence the Virgin Mary is often represented with a lily in her hand or by her side.

Lilybæ'um, the name given by the ancients to Cape Bœo, the most western promontory of Sicily. The Carthaginians, about B. C. 350, founded here a town of the same name, which became their principal naval station in Sicily.

Lily of the Valley.

Lily of the Valley, a plant of the natural order Liliaceæ, distinguished for its beautiful bell-shaped flowers of an agreeable odor. It is found in Europe, Asia, and North America.

Lima, county seat of Allen co., O., 130 m. n. by e. of Cincinnati; on the Ottawa river, and on the Cinn., Ham. & Dayton, the Erie, the Lake Erie & Western, the Detroit Southern and the Pennsylvania railroads. It is in the center of the great Ohio petroleum and natural gas belt and ships great quantities of oil. It has oil refineries, railroad shops, and car, locomotive and machine works. Pop. 1900, 21,723.

Lima, the capital of Peru, is situated at the foot of granitic hills, 7 mi. from Callao, its port on the Pacific, on the small river Rimac. The manufactures are unimportant, but there is a considerable import and export trade through the port of Callao. The climate is very agreeable, but the locality is subject to earthquakes, the most destructive being that of 1746. Lima was founded in 1535 by Pizarro, and called Ciudad de los Reyes (City of the Kings). In January, 1881, Lima capitulated to the Chileans, who occupied it for upward of two years. Pop. est. at 100,000.

Limbourg (or Limburg), a province of Belgium; area 931 sq. m. Pop. 220,658. Hasselt is the capital.

Limburg, a province of Holland, partly intersected by the Maas; area 850 sq. mi.; pop. 254,846. Agriculture and cattle rearing are the chief occupations, and there is a large export trade in butter and cheese. The capital is Maastricht.

Lime, the oxide of the metal calcium. This oxide, which in a state of combination is one of the most abundant bodies in nature, has been known and used from the remotest antiquity. The forms in which it occurs native are very numerous, but it does not exist in a pure state in nature, its affinity for carbonic acid being such that it absorbs it from the atmosphere, when it becomes converted into carbonate of lime. Combined with carbonic, sulphuric, phosphoric, and other acids it constitutes large rock masses, and even mountains; it is present in sea, and other waters; it is a constituent of most soils and of a great number of minerals; and is essential to plants and animals.

Ordinary lime is obtained with most facility from the carbonate, from which by a strong heat the carbonic acid may be expelled. This process is conducted on a large scale with the different varieties of limestone, which are calcined or burned in order to obtain the caustic earth, or *quicklime*, as it is called. The lime thus obtained, however, is rarely pure enough for chemical purposes. Pure lime is a soft, white substance, of the specific gravity of 2.3. It is quite infusible, but when heated in the oxyhydrogen blowpipe it emits one of the intensest of artificial lights, and it has accordingly been employed for a signal light and for facilitating the observation of distant stations in geodetical operations.

The uses of lime are almost too numerous to mention, for there is hardly any operation in the

arts for which lime is not at some part indispensable. In the manufacture of basic Bessemer steel it forms about one half of what is called "Thomas slag," which, when ground, makes a cheap and efficient fertilizer; it is employed in the early stages of leather dressing to remove hair, fat, etc., from the hides; it is used in metallurgy as a flux; in soap boiling to causticize the alkaline liquors; in the manufacture of washing soda; for neutralizing acids; for making mortars and cements; in agriculture to destroy inert or noxious vegetable matter, and to decompose heavy clay soils; and in the *materia medica*, chiefly as an antacid.

Lime, a small globular-shaped lemon, the fruit of a shrub about 8 ft. high. It is a native of India and China, but was introduced into Europe long before the orange, and is now extensively cultivated in the south of Europe, the West Indies, and some parts of Southern America. The fruit is agreeably acid, and its juice is employed in the production of citric acid, in beverages, etc.

Lim'erick, a city of Ireland, capital of Limerick co., and a county of itself. The industries include the curing of bacon, the preparation of butterine, flax spinning and weaving, and lace making. There are distilleries, breweries, tanneries, corn mills, a large military clothing establishment, and shipbuilding slips. Limerick is the leading port on the west coast for the shipment of produce. Pop. 37,072.

Limestone, a species of mineral comprising numerous varieties of carbonate of lime, differing considerably in external appearance, structure, and composition. It is, if pure, essentially composed of 57 parts of lime and 43 of carbonic acid; but in some rocks the limestone is intermixed with magnesia, alumina, silica, iron, etc. All limestones give readily to the knife. They are infusible; but when impure, by an admixture with a portion of other earths, they vitrify in burning. All limestones effervesce when a drop of strong acid is applied on the surface, and they dissolve entirely in nitric or hydrochloric acid. Limestone is found both in primary and in secondary rocks, but most abundantly in the last. It is also not uncommon in alluvial deposits, when it is called *calcareous tufa*. Limestone has frequently a granular structure: and the size of the grains is variable, in some degree corresponding with the relative age of the mineral. Thus limestone which occurs in beds in gneiss, has usually a coarse texture, and large granular concretions; but when its beds exist in mica slate, or argillite, its texture becomes more finely grained, and its color less uniform. Silurian and Devonian limestones have a texture more or less compact; the colors are often variegated; and they often contain fossils. Secondary limestone has a compact texture, a dull fracture, and usually contains shells, and sometimes other organic remains. It is always stratified. The specific gravity of limestone varies from 2.30 to 2.90. Calcareous spar is the purest variety of carbonate of lime. It is frequently very transparent, and is then strongly double-refractive, this peculiarity being best seen in the variety known as *Iceland spar*. Among the varieties of limestone are: *calcareous spar*, *granular limestone*, *foliated limestone*, *compact limestone*, *oolite* or *roestone*, *peastone* or *pisolite*, etc. Compact limestone passes into *chalk* when the particles are somewhat loosely connected with each other, so that the whole assumes an earthy character. A variety of very fine-grained compact limestone is used in lithography, the best being that obtained near Pappenheim and Solenhofen in Bavaria.

Limnæ'a, a genus of fresh-water, univalve, gasteropodous molluscs, having a lung sac instead of gills. They have the power of floating on their back, the foot forming a kind of boat. They are found in all parts of the world, and occur fossil, especially in the Wealden.

Limoges (li-mōzh), a town of Western France, capital of the department of Haute-Vienne, and former capital of Limousin. The principal industry is the manufacture of artistic porcelain, known as Limoges ware, and employing over 6,000 hands; there are also wool and cotton spinning mills, cloth factories, foundries, paper mills, and extensive shoe and clog making establishments. In 1790, and again in 1864, whole quarters of the city were destroyed by fire. Pop. 68,477.

Li'monite, a very important ore of iron, varieties of which are bog iron ore and brown hæmatite. It is a hydrated oxide of a brownish color, occurring in mammillated or botryoidal masses, and found in various parts of England, and abundantly on the Continent and in America.

Limpet, a gasteropodous mollusc which adheres to rocks partly by the suctorial powers of its broad disc-like foot and partly by a glutinous secretion. The common limpet (*Patella vulgaris*) is often found ensconced in a shallow pit excavated out of the rock, and which it has made or rasped out by the siliceous particles embedded in its foot. From this pit the limpet, when covered by the tide, makes short journeys in quest of its food, which consists of algæ, and which it eats by means of a long ribbon-like tongue covered with numerous rows of hard teeth. The limpet is used as bait, and is eaten by the poorer classes of Scotland and Ireland. In tropical seas limpets attain an immense size, one species having a shell about a foot wide.

Lina'ceæ, the flax family, a small natural order of exogenous plants, scattered more or less over most parts of the globe, those in temperate and southern regions being herbs, while the tropical representatives are trees or shrubs. They are principally characterized by their regular flowers, with imbricate glandular sepals having a disc of 5 glands outside the staminal tube; the ovary is 3 to 5 celled, with 2 ovules in each cell; the albumen is fleshy; the leaves are simple, usually stipulate, rarely opposite. The tenacity of the fiber and the mucilage of the diuretic seeds of certain species of *Linum*, such as the common flax, are well known.

Linaloe-wood, a wood obtained from tropical America (probably from a species of *Amyris*), yielding a fragrant oil used in perfumery.

Lina'res, a town of Spain, prov. Jaen, the chief town in a district rich in lead mines. Pop. 25,000.

Lincoln (ling'kon), a city of England and a county in itself, capital of Lincolnshire, 120 mi. n. of London. The manufacture of agricultural implements and machinery forms the chief branch of industry. Pop. 41,491. LINCOLNSHIRE is a large maritime county on the east coast of England; area 1,767,879 acres. In consequence of the richness of its pastures Lincolnshire has been long celebrated for its breed of horses, cattle, and sheep. In the best parts of the fens and marsh under tillage the crops chiefly cultivated are oats and wheat. Lincolnshire is divided into three parts—Holland, Kesteven, Lindsey. Pop. 472,778.

Lincoln, Logan co., Ill., in the central part of the state. Railroads: P. D. & E.; C. & A.; and Illinois Central. Industries: machine shops, brick and tile yards, etc., also two coal mines. It is the seat of Lincoln University and State Institutions for Imbecile Children. Pop. 1900, 8,962.

Lincoln, Lancaster co., Neb., capital of the state. Railroads: C. R. I. & P.; Union Pacific; Burlington & Missouri River; Missouri Pacific; and Fremont, Elkhorn & Missouri Valley. Industries: It has large manufacturing interests among which may be mentioned large packing houses, canning factories, potteries, brick and tile works, and carriage works. Lincoln is an important educational center, being the seat of the state university, Nebraska Wesleyan University, Cotner University, Adventist and Episcopalian colleges. The state insane asylum and penitentiary are located here. Pop. 1900, 40,169.

Lincoln, ABRAHAM (1809–1865), the sixteenth president of the U. S., b. in Kentucky. He removed with his family, in 1816, to Spencer co., Ind., and for ten years engaged in laborious work of various kinds, having only about a year's schooling at intervals. On the breaking out of the Black Hawk War, in 1832, he joined a volunteer company, and as captain served three months in the campaign. He next opened a country store, was appointed postmaster of New Salem, Ill., began to study law, and at the same time turned amateur land surveyor. In 1834 he was elected a member of the Illinois legislature, to which he was again returned at the three following biennial elections, and in 1836 he was licensed to practise law. In 1846 he was elected a representative in Congress for the central district of Illinois, and voted steadily in Congress with the anti-slavery party. In 1849 and again in 1858 he was unsuccessful in attempts to enter the senate. In the Republican National Convention held at Chicago in May, 1860, he was nominated as a candidate for the presidency, and after several votes he gained a majority, and was eventually chosen unanimously. The Southern States, exasperated at this defeat, and alarmed at the aggressive anti-slavery policy which many of the leading Republicans had proclaimed their determination to follow, refused to acquiesce in Lincoln's election, and began one after another to announce their secession, and to organize the means of resisting the enforcement of the claims of the central government. The election of Lincoln took place in November, 1860, and he assumed office on March 4, 1861. It was the intention of Lincoln to use every means of conciliation consistent with the policy he deemed it essential to the national interest to pursue. On one point, however, his resolution was steadfast, to admit no secession, and before his assumption of office secession was as resolutely determined on by the other side. On February 4 the Southern Confederacy had been constituted, and on April 13 the first blow in the Civil War was struck by the capture of Fort Sumter by the Confederates. The events of the Civil War during the next four years in Lincoln's career belong to the history of the U. S. Lincoln's persistence in raising and pouring in fresh troops after every disaster finally enabled the Federal government to subdue the secession. The toleration of slavery was always in Lincoln's opinion an unhappy necessity; and when the Southern states had by their rebellion forfeited all claim to the protection of their peculiar institution, it was an easy transition from this view to its withdrawal. The successive stages by which this was effected—the emancipation of the slaves of rebels, and the offer of compensation for voluntary emancipation, followed by the constitutional amendment and unconditional emancipation without compensation—were only the natural steps by which a change involving consequences of such vast extent was reached. The determination of the Northern states to pursue the war to its conclusion on the original issue led to the re-election of Lincoln as president in 1864. The decisive victory of Grant over Lee on April 2, 1865, speedily followed by the surrender of the latter, had just afforded the prospect of an immediate termination of this long struggle, when, on the 14th of the same month, President Lincoln was shot in Ford's Theater, Washington, by an assassin named John Wilkes Booth, and expired on the following day. In the affections of America, Lincoln holds a place second only to Washington. Plate 1, Vol. I.

Lincoln, ROBERT T. (1843–), b. at Springfield, Ill., and educated at Harvard. In the Civil War he served as captain on General Grant's staff. After the war he went to Chicago and practised law. In 1881 he became secretary of war in President Garfield's cabinet. He was U. S. minister to England during Harrison's administration.

Lind, JENNY (Madame Otto Goldschmid) (1821–1887), singer b. in Stockholm. She received part of her musical training under Garcia at Paris; achieved her first success in Berlin in 1845, and subsequently was received with a great ovation in her native city of Stockholm. She made her first appearance in London at Covent Garden in 1847 before an enthusiastic audience; went to the U. S., where she mar-

ried Herr Goldschmid in 1851; returned to Europe and made an extensive tour, finally settling in England. In recent years she seldom came before the public, but as professor in the Royal Academy of Music, and as trainer of the female voices of the Bach choir conducted by her husband, her talents were not lost.

Linden, a handsome forest tree, with alternate, simple, and cordate leaves, and sweet-scented flowers, disposed on a common peduncle. The common linden (*T. europæa*) is a well-known tree. The inner bark of all the species is very tenacious; it is called *bast,* and mats

Linden; *a.*—a flower.

are made of it in Russia in large quantities. The wood is rather soft, close-grained, and much used by turners. The American lime, or basswood, is a large and beautiful tree, resembling the European species.

Lindsay, Ontario, Canada, on the Grand Trunk Railway. Pop. est. 1897, 7,100.

Linen, cloth made of flax; has had a very ancient and extensive use. On the early monuments of Egypt artistic representations of the various processes of linen manufacture have been found, and the fine linen fabric in which the Egyptians wrapped their embalmed dead still gives evidence of the skill which they possessed. The Jews took with them into Canaan a knowledge of the manufacture; Tyre, Sidon, and Carthage seem also to have acquired the industry; while at an early period the manufacture of linen appears to have been common in Greece and Rome. In the Middle Ages linen and woolen were the chief articles of dress in all European countries, and among the Flemings in particular the flax manufacture rose to great importance. The linen manufacture has been known in England, Ireland, and Scotland for a long period. As early as the seventh century the Anglo-Saxon women were skilled in the weaving of this fabric, and fine linen was made in Wilts and Sussex in the thirteenth century. Since the extensive introduction of cotton, however, the linen industry has decreased in relative importance, this result having come about mainly within the present century. In Ireland the manufacture of linen was well established in the seventeenth century; subsequently it declined; but lately it has again obtained a flourishing position, Belfast being the center of the manufacture. The machinery used both in spinning and weaving linen is in general, with the exception of some special adaptations, the same as that used for cotton. The chief varieties of linen now manufactured are, lawn, which is of fine quality and mostly produced in Ireland, plain cloths for shirtings, bedding, etc., damasks, table cloths, and other ornamental fabrics; and cambric, which is the finest of all linen fabrics.

Line of Beauty, a term used by some artists for an ideal line, frequently represented in the form of a very slender, elongated letter S.

Ling, a species of sea fish allied to the cod family (Gadidæ), and measuring from 3 to 4 ft. in length. It abounds around the British coasts, is caught with hook and line, and preserved in immense quantities in a dried state. From the beginning of February to May the ling is in highest perfection; the spawning season commencing in June.

Lin'gula, a genus of molluscs of the class Brachiopoda and family Lingulidæ, a family that has survived with but little change since the early Silurian period. These molluscs are one of the few examples of pedunculated bivalve shells. The members of the genus inhabit the Indian Archipelago and the Australasian seas.

Lin'iment, in medicine, a species of soft ointment of a consistence somewhat thinner than an unguent, but thicker than oil. The term is also applied to spirituous and other stimulating applications for external use.

Link, in land-measuring, a division of Gunter's chain, having a length of 7.92 in. The chain is divided into 100 links, and is 66 ft. in length; 100,000 sq. l. make an imperial acre.

Linnæ'a, a genus of plants of the natural order Caprifoliaceæ (honeysuckles). It contains but one species, a creeping evergreen plant found in woods and in mountainous places in Scotland and other northern countries, including North America as far south as Maryland, bearing two beautiful, drooping, fragrant, bell-shaped pink flowers on each flower-stalk. The plant was an especial favorite of Linnæus, and was named in honor of him by Gronovius.

Linnæan Society, a society in London, instituted in 1788 by Dr. (afterward Sir) J. E. Smith, and incorporated in 1802, for the promotion of the study of all departments of botany and zoology. It has an excellent library, a museum, and herbarium, the nucleus of which were formed by the collections of Linnæus himself. Fellows take the initials F. L. S.

Linnæ'us. See next article.

Linné (lin'nā), KARL VON (1707–1778), com-

monly called Linnæus, the greatest botanist of his age, was b. at Råshult, Sweden. He showed an early interest in botany; entered the University of Lund, where his botanical tastes were encouraged; and removed to Upsala in 1728, where he undertook the supervision of the botanic garden. Here he made the acquaintance of the botanist Rudbeck, whose assistant he became. Aided by the Academy of Sciences at Upsala Linné made a journey through Lapland, the result of which was shown in his *Flora Lapponica*, published 1735. In this year he went to the University of Harderwyk in Holland and took an M.D. degree; afterward visited Leyden, where he published the first sketch of his *Systema Naturæ and Fundamenta Botanica*. In 1736 he visited England, went to Paris in 1738, and afterward settled in Stockholm as a physician. He became professor of medicine at Upsala in 1741, and then of botany and natural history; was made a knight of the Polar Star with the rank of nobility; and d. on his estate near Upsala from apoplexy. The great merit of Linné as a botanist was that he arranged plants on a simple system of sexual relationship, and prepared the way for the more natural and satisfactory classification which has superseded the Linnæan system. Nor must it be forgotten that he was eminent not only in botany, but in all the sciences of his time.

Linnet, a small singing bird of the finch family. Its general plumage is brownish, the top of the head and breast being reddish in the breeding season. It is one of the commonest of British birds, everywhere frequenting

open heaths and commons, and breeding in the furze and other bushes. They are cheerful and lively birds, and very sweet and pleasing songsters. Called also provincially *Lintie* and *Lintwhite*.

Lino'leum, a preparation of linseed oil with chloride of sulphur, by which it is rendered solid and useful in many ways. When rolled into sheets it is used as a substitute for india rubber or gutta-percha; dissolved it is used as a varnish for waterproof textile fabrics, table-covers, felt carpets, and the like; as a paint it is useful both for iron and wood, and for ships' bottoms; as a cement it possesses some of the qualities of glue; vulcanized or rendered hard by heat it may be carved and polished like wood for moldings, knife handles, etc., and mixed with ground cork and pressed upon canvas it forms floor cloth.

Li'notype, a recently-invented printing machine, in which types are discarded, and matrices used instead, these being brought to the proper places by touching corresponding keys, the rows of matrices being then automatically filled with molten metal so as to produce solid bars or lines of type, and then automatically returned to their places.

Linseed Oil, the oil got from the seeds of flax either by pressure in the cold or by heating to about 200° F. The smooth, shiny, oval seeds are carried to the upper part of the mill and placed in large bins. From the bins it is drawn off and as it comes down the shaft it strikes a long tin pan which guides it between two rollers where it is cracked apart. It slides down then between two more rollers and is ground still finer. When it comes out of the mill it is a warm, dry meal resembling buckwheat in appearance. In this condition it forms the flaxseed poultice of commerce. From the mills the meal goes into the heating and stirring machine, which consists of two iron tanks set one above the other. As the meal pours into the upper one of these, jets of hot steam are injected into it, and a set of paddles attached to a central shaft keeps the mass stirred up. After remaining for a time in the upper pan, the meal is allowed to slide through a trap into the lower pan, where it is again heated with steam and stirred for about fifteen minutes. While in this pan the meal is so greasy and fine that it has all the appearance of being liquid, but only enough steam has been injected to moisten it very little. From one side of the lower tank the meal is drawn out into a little drawer which contains about fifteen pounds. It is spread over a sheet-iron tray about a foot wide and three feet long, the bottom of which has first been covered with a thick piece of camel's-hair cloth. When it is full the cloth is folded over the top and pressed down. The meal is then ready for the oil presses. Twenty of the cakes in their camel's-hair coating are taken on a truck to the front of one of the presses. When a signal is given the huge steel pressure piston which comes up from the vat of oil below slowly descends. Then two wooden doors which shut in the press are opened, and the flattened and oilless cakes which have been in the press for fifty minutes are taken out. The press is about 8 ft. high and is made of steel plates which can be run up and down between two guiding posts. Each of the plates is lined top and bottom with a camel's-hair mat. When the pressed cakes are all out, the unpressed cakes are put in their places between the plates, leaving the camel's-hair jackets around them. Then the wooden doors are closed and pressure is given. Finally the foamy, yellow oil bursts through the camel's-hair covering of the meal and rushes down a spout into the tanks below. A steady pressure of 3,500 pounds to the sq. in. is kept up for fifty minutes, and by this time practically all the oil is out of the meal. The cakes which remain are as hard as boards and

of a dark gray color. Their edges are trimmed off and they are packed in sacks ready to be sold for cattle food. The oil is forced through a series of large filters which remove the impurities. If it is to be used as raw oil it is ready for barreling and shipment, but a large part of the oil is boiled and refined. The boiling is done in large kettles and a considerable quantity of manganese is added to give it the property of drying quickly. After it is cooled for some time it is ready for the market. The yield of oil is about 28 per cent. of the seeds pressed. The oil is used largely by paint and varnish makers. It also plays an important part in the manufacture of oil cloth and of lincrusta walton, which is used for interior decoration. Printer's ink is also made of linseed oil. The price of pure oil varies from 57 to 60 cents a gallon.

Linum, the flax genus of plants. There are about eighty species, herbs or rarely small shrubs, chiefly found in the temperate and warmer extra-tropical regions of both hemispheres. Few are of any importance, except the flax plant.

Linz (lints), the capital of Upper Austria, situated on the right bank of the Danube, 98 mi. w. of Vienna. The manufactures consist chiefly of woolen, linen, silk, and cotton goods, machinery, hardware, etc. There is an extensive trade on the Danube. Pop. 47,560.

Lion, a quadruped of the cat genus, the most majestic of all carnivorous animals, distinguished by its tawny or yellow color, a full flowing mane in the male, and a tufted tail with a sort of sharp nail at the end of it. The largest lions are from 8 to 9 ft. in length. The period of gestation is five months; one brood is produced annually, with from two to four

Lion.

at a birth, and the mother nourishes the whelps for about a year. The mane of the male lion begins to grow when it is three years old; the adult age is reached about six or seven; and the extreme age is about twenty-two, although authorities differ from this estimate. The lion is a native of Africa and parts of Western and Central Asia. He preys chiefly in the nights and on live animals, avoiding carrion, unless impelled by intense hunger. He approaches his prey with a stealthy pace, crouching when at a proper distance, when he springs upon it with fearful velocity and force. The whole frame is extremely muscular, the foreparts being particularly so, giving with the large head, flashing eye, and copious mane, a noble appearance to the animal, which has led to his being called the "king of beasts," and to fancies of its noble and generous nature which have no real foundation. Of the African lion there are several varieties, as the Barbary lion, Gambian lion, Cape lion. The Asiatic varieties are generally smaller and may want the mane, as the maneless lion of Gujerat. The American lion is the puma.

Liquation (or Eliquation), the process of separating by a regulated heat an easily fusible metal from an alloy in which is a metal difficult of fusion. Thus in the refining of tin to remove slag, iron, copper, and other metals, the ingots are heated in a reverberatory furnace to a temperature just sufficient to melt the tin, which is allowed to run into a basin, while the impurities are left behind on the hearth.

Liquid Air. Air can be reduced to the form of a liquid by compression and low temperature. A cubic foot of liquid air contains 800 cubic feet of air at ordinary pressure, and the temperature is 312° Fahr. below zero.

It was thought until recently that certain gases were "permanent," i. e., they could not be liquefied. All efforts to reduce them to liquid had failed. In 1806, however, one of these gases, chlorine, was reduced to a liquid by Northmore, an English chemist, and then the theory of "permanent" gases was broken down. It is a well-known fact that within recent years several gases have been liquefied on a large scale by means of pressure. Ammonia is one of these, and it is used for producing low temperatures and in the manufacture of ice. It was discovered in 1869 that for every gas there is a temperature above which it is impossible to liquefy it. This temperature is known as the "critical temperature," and the pressure to which gas must be subjected at this temperature in order that it may be reduced to the liquid form is known as the "critical pressure." The only problem then is to secure the pressure and the degree of temperature. The pressure is easily secured by means of air pumps and vessels strong enough to stand the pressure. To secure a temperature as low as —312° Fahr., however, has always been the difficult problem. Two French experimenters, Pictet and Cailletet, in 1877 succeeded in liquefying oxygen, and to their success is due the present knowledge of the method of securing extremely low temperature. Pictet employed an apparatus in which two powerful pumps compressed sulphur dioxide gas and carbon dioxide to a liquid. The former was used to cool the latter This cold carbon dioxide was then rapidiy evaporated, producing a temperature of —266° Fahr When oxygen under pressure was submitted to this cold vapor a portion of the oxygen immediately liquefied. Cailletet used a hydraulic press capable of producing pressure as high as 15,000 pounds to the square inch.

LIQUID AIR

1. Tea kettle in full steam on a hot stove, yet the exterior is covered with frost.

2. Driving a nail with a hammer made of ice previously subjected to treatment of liquid air.

3. Sponge dipped in a glass of liquid air, coming out as a snowball.

4. Tea kettle filled with liquid air in full steam while resting on a cake of ice.

The oxygen under this pressure was allowed to escape and the resulting rapid expansion lowered the temperature of the escaping gas to such a degree that a portion of it liquefied. A few years later Wrobleski and Olszewski, in Russia, produced liquid oxygen in an apparatus employing rapid evaporation and liquid ethylene. They succeeded in securing a temperature of —266.9° Fahr., and thus succeeded in freezing alcohol. They also succeeded in producing small quantities of liquid air. In 1884 Professor Dewar, of London, experimented along the same line as Pictet and produced liquid air and oxygen in considerable quantities. Other Europeans who are working on liquid air are Fleming, Hampson and Linde. Perhaps the most successful of all, however, is Mr. Charles Tripler, of New York City, who has developed a form of apparatus by which he can produce liquid air in large quantities at a moderate cost. This apparatus employs the expanding air to secure the desired low temperature. His machine consists of a straight line air compressor with a steam cylinder and three air cylinders. In the first air cylinder the air is compressed to about sixty pounds to the square inch. It is then passed to a second cylinder and compressed to about 400 pounds per square inch. The last cylinder raises the pressure to about 2,500 pounds per square inch. It is a well-known fact that when air is compressed the temperature of it is raised. This may be illustrated by the use of a small hand pump in filling the tire of a bicycle, it will be observed that the pump becomes heated. The air is cooled by running water between each of the three cylinders used in the process of compression. The last cylinder is a large tank in which the air pipe is coiled. After leaving this pipe the air is passed through a purifyer which removes all moisture and particles of dust. The air then passes into a coil pipe which is surrounded by a casing packed with felt to keep it free from external heat. At the lower end of this coiled tube is an expansion valve from which the cool air at about 2,500 pounds pressure is permitted to expand to about atmospheric pressure into the space between and around the coiled pipe. This air finally escapes and the air in the inner tube is soon cooled down so far that a considerable part of the air that escapes in the expansion tube appears in the liquid form. This collects in the lower part of the jacket and may be drawn off by means of a stopcock.

Mr. Tripler has demonstrated to a certain extent the power which is stored up in this liquid. On account of the expansion which takes place when the liquid air is set free, he can use it to run a small engine, and he maintains that if he can run a small engine with it it is only a matter of time until larger engines will be constructed to be run by the same power. He has conducted experiments showing the effects of very low temperature upon a number of substances. Rubber, for instance, immersed in liquid air becomes brittle. A piece of meat also becomes brittle and can be broken into small fragments by the blow of a hammer. Mercury is easily frozen by it; iron becomes brittle; alcohol is also easily frozen by means of liquid air. The uses to which liquid air may be put have been briefly outlined by those who know its properties. In the first place, it can be used as a cooling agent. On account of its enormous power of expansion it can be used as a motive power in the same manner as compressed air is used. Mr. Tripler has shown this by the experiments he has made with the small engine in his laboratory in New York. It may also be used as an explosive. An experiment was conducted to show the explosive force of liquid air. A piece of oily waste was soaked in the liquid and placed inside a small iron tube, open at both ends. This was placed inside a larger and stronger tube, also open at both ends. The waste was then ignited by a fuse and the resulting explosion blew the inner tube to pieces and burst a large hole in the outer tube. If the experiments with liquid air as an explosive prove successful it can be used in mining.

Liquid air has been very successful in medicine as a local anæsthetic, the only danger being that the part anæsthetized may become frozen. It has also been found useful in the treatment of ulcers, carbuncles, and boils, and it relieves pain caused by sciatica or neuralgia almost instantly. Experiments have been made for the purpose of discovering its effect upon bacteria. The results do not show that it is a germ destroyer. Notwithstanding the intense cold to which the bacteria are subjected, they retain their vitality even after a long period of immersion in the liquid.

Liquidam'bar (Liquidamber), a genus of trees. They are handsome trees, with lobed shining leaves, and catkins or globular heads of monœcious flowers. The fragrant liquid resin called oil of liquidambar and copal balsam is obtained from the *Liquidambar styraciflua*, found in Mexico and the U. S., Oriental liquidambar tree yields common storax, which is used as a stimulant expectorant.

Liq'uorice, a name for herbs growing in S. Europe, Asia, and Africa. *G. glabra* is a perennial plant with herbaceous stalks and bluish papilionaceous flowers. The well-known liquorice juice, used as a demulcent and expectorant, is extracted from this root as well as from that of others. Stick liquorice is made by pounding the roots to a pulp, boiling, evaporating and rolling into sticks.

Lisbon, (Portuguese, *Lisboa*), the capital, and principal seaport of Portugal, on the right bank of the Tagus, about 9 mi. above its mouth. The exports consist chiefly of wine, oil, and fruit, and the principal imports are cotton, cotton tissues, sugar, grain, coal, tobacco, coffee, etc. The manufactures are tobacco, cotton, wool, silk, paper, chemicals, soap, etc. Lisbon is a place of remote antiquity, its earliest name being *Olisipo*. In 1755 it was visited by an earthquake, which threw down a considerable portion of the city, and destroyed above 30,000 of its inhabitants. It was taken by the French in 1807, but re-

sisted an attack by Massén: in 1809. Pop. 246,343.

Lister, Sir Joseph, Bart. (1827), English surgeon, was b. at Upton, Essex, became M. B. B. of London University, and a fellow of the Royal College of Surgeons in 1852. From 1860 to 1869 he was professor of surgery in Glasgow University; from 1869 to 1877 professor of clinical surgery in the University of Edinburgh, being in the last-mentioned year appointed to the corresponding chair in King's College, London. His name is more especially connected with the successful application of the antiseptic treatment in surgery, which inaugurated a new era in this branch of medical science. He has published various papers on *Surgical Pathology*, etc.

Liszt, Abbe Franz (1811–1886), an eminent pianist and composer, was b. in Hungary. He made his first public appearance in his ninth year; studied in Vienna and Paris; produced an opera in 1825, and became director of the Court Theater at Weimar in 1849. This gave him the opportunity to introduce the music of Wagner, Berlioz, Schumann, and the writers of what is known as "the music of the future." In 1861 he took up his residence in Rome, where he joined the priesthood. In 1870 he became director of the Conservatory of Music at Pest. His chief works are the *Faust* and *Dante* symphonies, and the oratorios *St. Elizabeth* and *Christus*.

Litchfield, Montgomery co., Ill., 50 mi. n.e. of St. Louis. Railroads: Wabash; C. C. C. & St. L.; L. C. & W.; Jacksonville & St. Louis; C. P. & St. L.; and St. Louis, Peoria & Northern. Industries: car and machine co., iron foundry, two flouring mills, brick and tile works, and oil-can factory. Coal and oil in vicinity. Surrounding country agricultural and mineral. The town was first settled in 1853, and became a city in 1859. Pop. 1900, 5,918.

Litchi (or Lee-Chee), the fruit of a tree, native of the s. of China. The tree is of a moderate size, with brown bark, the leaves large, and the fruit is produced in bunches, which are pendant from the extremities of the twigs. The litchi is a red or green berry, about 1½ or 2 in. in diameter, with a tough, thin, leathery coat, and a colorless half-transparent pulp, in the center of which is a single brown seed. The pulp is slightly sweet, and grateful to the taste.

Lith'arge, the yellow or reddish protoxide of lead partially fused. It is extensively used in the manufacture of glass, of enamels, of artificial gems, of lead plaster and lead soap, of sugar of lead, white and red lead, and other compounds.

Lith'ia, the only known oxide of the metal lithium, which was at first found in a mineral called petalite. It is of a white color, very soluble in water, acrid, caustic, and acts on colors like other alkalies.

Lith'ium, the metallic base of lithia, which base was obtained by Sir H. Davy in the electrolysis of fused lithium or chloride. It is of a silver white luster, but quickly tarnishes in the air. Lithium may be cut with a knife, but it is scarcely so soft as potassium or sodium; it fuses at 180° C., and takes fire at a somewhat higher temperature. Lithium floats upon rock oil; it is the lightest of all known solid bodies. It forms salts analogous to those of potassium and sodium. Compounds of lithium are used in pyrotechny on account of the splendid red color they impart to flame. In medicine the carbonate is employed especially as a solvent for uric acid, to prevent the formation of calculi and to remove it from the system in gout. Effervescing lithia water is sometimes used in place of soda or potash water. Citrate of lithia is also employed. Its therapeutic properties are similar to those of the carbonate.

Lithog'raphy. — The whole art of lithographing includes lithograph engraving, crayon lithograph, chromo lithograph, etc. The best lithographic stones are produced in Germany. This peculiar stone is a fine variety of limestone which is remarkably homogeneous and fine grained, and generally of a gray or light cream color. It can be split into plates several feet square and of a uniform thickness, varying from seven eighths to one twelfth of an inch. A greasy composition of ink is made to stick to the stone and this composition will take printer's ink. Before the ink roller is passed over the stone the surface is dampened with water, and the ink on the roller will pass over the film of water without touching the stone, but will stick to the composition, so that when a sheet of paper is pressed on the stone it will receive the impression. In practise all the surface of the stone except that protected by the greasy ink or composition is eaten away by nitric acid so that the design, lettering, or figures are raised above the general surface.

The engraved or transfer process is as follows: Before the lithographic stone can be used it must be polished. When the stone is polished it is taken to the engraver. He takes a piece of sheet gelatin, glossy and transparent, with a hard skin, and lays it over the design which is drawn on cardboard. To make it stick to the cardboard so that the gelatin will not slip in tracing, the engraver moistens one end of the sheet with saliva, and sticks the gelatin to the cardboard. Then with an engraving needle, which is a pencil with a fine steel point instead of a lead point, he traces on the gelatin the general outline of the design which can be seen underneath the sheet. The needle cuts the lines which give a general outline of the lettering, lights, and shades. Then the gelatin is torn off, and the engraver rubs over the gelatin a piece of dry blue coloring resembling soft chalk. The coloring material fills the marks made by the needle.

Before the stone is brought to the engraver, it is rubbed over with a weak solution of nitric acid and gum arabic, which fixes the stone so that no ink or grease will stick to it. The engraver puts in a red or black ground by rubbing over the stone a piece of red chalk or a preparation of lampblack. It is then ready to receive the outline of blue color in the gelatin.

The gelatin sheet is laid over the stone with the marked side down and is stuck to the stone as it was to the paper by moistening the edge of the gelatin sheet. The engraver goes over the back of the gelatin with a rubber having a hard, smooth surface, and the pressure transfers the blue color in the gelatin to the red ground of the stone, so that the general outline of the design is traced on the stone in a reversed position. The lithograph engraver uses two kinds of needles in his work, one a fine pointed needle for engraving the outlines, the other a flat pointed needle for scraping in the solids. Split diamonds set in ebony holders are used for engraving the outlines of script. The solids in the design are engraved first, the tints and shadings being left until later.

When the blacks or solids are cut in the stone, it is taken to the inking table, where some boiled linseed oil is rubbed over the engraved part of the stone. The oil sinks into the stone somewhat wherever it has been touched by the needle and prepares it to take ink. In this way the engraver tests his work as he goes along. The oil is then removed and the stone dampened, after which ink is rubbed into the engraving. The ink does not stick to the dampened part, but only to the part where the linseed oil has made it greasy. The ink fills the engraving and the practised eye of the engraver knows whether his work is well done or not. The engraver then sponges the stone with water and gum arabic to protect it from dust or any grease spots, and after washing the gum off, takes the ink from the engraving with turpentine and then washes off the turpentine with water and prepares the stone for the etching of the ruled lines. The engraver blocks out the shades and tints of the design and covers the entire surface of the stone with an acid proof composition of varnish, wax, resin, pitch, gum arabic, Venetian turpentine, and common turpentine, all of which have been boiled together. The stone is then laid away to dry.

The cloud work, shades, and tints are made by fine lines running parallel, some of them 90 to the inch or even finer spacing. These lines are etched on the stone after the etching ground has been ruled on the ruling machine. The diamond merely cuts through the etching ground to the stone. The acid is then put on with a fine brush where it is needed. Experience alone guides the engraver in etching as to the length of time the acid is to work. After the etching is ended the acid is cleaned off, oil is put on the etched lines, and turpentine takes the asphaltum off the stone, and then the protective gum arabic is put on, and the stone is carried to the press of the transferer. Oftentimes one design is made up of parts of a dozen different designs. The transfer press is an iron table which slides on a frame under a cross bar. In the cross bar is a leather covered piece of wood which scrapes on the zinc sheet of the press. The stone is laid on the bed, a paper laid over the engraving, a strip of sheet rubber laid over the paper, and other paper over it, and then the zinc lid is laid on the stone. A gear worked by a crank pulls the bed under the rubber, and the pressure transfers the ink in the engraving to the preparation on the paper. Then the other stone is laid on the press and the transfers are laid according to the order in which they are to be grouped, directly on the stone, the inky side down, and the stone is run through the press. Then the paper is peeled away from the stone.

After the stone has been rubbed over with turpentine and rolled over with printer's ink to strengthen the lines, powdered resin is dusted over the stone, and sticking to the ink, acts as a preservative when the acid eats down into the stone. First a light etching is made with a weak solution of nitric acid and gum arabic, and after the stone has been cleaned and the lines strengthened again as before, and all the blemishes and spots have been taken out, a heavy etching is made. A few seconds is enough to etch the stone, and then the last etching is given, the stone is cleaned off, and, after sponging with gum water, is taken to the press. This press is so arranged that each time before an impression is taken, the stone passes under a roller which dampens it with water; then the ink roller follows and the impression is taken as in an ordinary printing press.

Lithot'omy, in surgery, the technical name for the operation popularly called cutting for the stone. As usually performed it consists in cutting through the perineum in front and to the left of the anus, so as to reach and divide the urethra and neck of the bladder where it is surrounded by the prostate gland. A grooved and curved staff is introduced into the bladder first, and then the incision is made in the perineum to reach the bladder, the groove in the staff serving as a guide to the knife. When thus performed, the operation requires seldom more than three minutes, and in favorable cases the wound heals in the course of a month.

Lithot'rity, in surgery, the operation of crushing a stone in the bladder into fragments of such a size that they may be expelled by the urethra. The instrument by which the stone is broken up is introduced in the same manner as a catheter or sound into the bladder, and after catching the stone either crushes, bores, or hammers it to pieces. The instrument, which is called a lithotrite, has two movable blades at the extremity, which are brought together to crush the stone by means of a powerful screw.

Lithua'nia, a region in Eastern Europe which formed a grand-duchy in the eleventh century; became united to Poland in the fourteenth century; and at the dismemberment of that kingdom, in 1773–95, was nearly all appropriated by Russia, now forming the governments of Mohilev, Vitepsk, Minsk, Vilna, and Grodno; area about 100,000 sq. mi., of which 6,700 are in Prussia. The Lithuanians are a race of people closely akin to the Letts. They are fair-haired, blue-eyed, and light-skinned; of mild disposition, and chiefly occupied in agriculture. Their language is akin to the Lettic and Old Prussian, and forms with these the Lithuanian or Lettic branch of the Aryan family of tongues. Their literature consists chiefly of

popular songs and hymns, religious works, tales, etc.

Litmus (or Lacmus), a peculiar coloring matter procured from *Roccella tinctoria* and some other lichens. Paper tinged blue by litmus is reddened by the feeblest acids, and hence is used as a test for the presence of acids; and litmus paper which has been reddened by an acid has its blue color restored by an alkali.

Liter, the French standard measure of capacity in the decimal system. The liter is a cubic decimeter; that is, a cube, each of the sides of which is 3.937 English inches: it contains 61.028 English cubic inches; the English imperial gallon is equal to fully 4½ liters, or more exactly, 4.54345797 liters.

Little Falls, Herkimer co., N. Y., on Mohawk River. Railroads: West Shore; N. Y. C.; and Little Falls & Dolgeville R. R. Industries: nine woolen mills, iron foundry, flour mill, bicycle and box factories. Surrounding country agricultural; great cheese market. The town was first settled in 1849. Pop. 1900, 10,381.

Little Rock, Ark., on Arkansas River. Railroads: St. L. I. M. & S.; L. R. & M.; L. R. M. R. & T.; L. R. & Ft. S.; St. L. Southwestern; and L. R. & M. R., now being built. Industries: railroad shops, four cotton-seed oil mills, delinting plant, and agricultural implement factories. The surrounding country is agricultural and mineral. Pop. 1900, 38,307.

Liver, the glandular structure which secretes the bile. This gland is not confined to the vertebrate animals, all of which—save the Amphioxus or lancelet—possess a well developed liver, but is found in many Invertebrata. In man, the liver is part of the alimentary apparatus, and is situated just below the diaphragm on the right side, extending across the middle line of the body toward the left side. Its front border reaches just below the border of the chest when the posture is sitting or standing; but when the person lies down the liver passes slightly up so as to be completely under cover of the ribs, except a small portion which extends beyond the lower end of the breast bone. From its position it is extremely liable to compression and injury. In its general form the liver is flat, broad, and thick toward the right side becoming narrow and thin toward the left side. Its upper surface is convex, or arched, and fits into the concave surface of the diaphragm, while its lower surface is irregularly divided into certain "lobes," five in number and separated by clefts, or fissures. These lobes are known as the right, left, spegelian, caudatus, and quadrate lobes. See *Anatomy.*

Liverpool, a city and seaport of England, county of Lancaster, on the right bank of the Mersey. Next to London—if it may be called next—this city is the chief seaport of the United Kingdom, or indeed in the world. The total aggregate of tonnage entered and cleared annually is smaller than at London; but, on the other hand, the foreign trade is greater, the exports being valued at $556,000,000, the imports at $489,000,000. Immense docks lie along both sides of the Mersey, with a length of 8 mi., a quay space of 30 mi., and a total water area of over 500 acres (including those of Birkenhead). In connection with the river one of the principal features is the famous floating landing-stage, its length of 2,063 ft. resting upon pontoons, which rise and fall with the tide. Among the imports cotton holds the chief place, followed by provisions and live stock, cereals, fruits, hides, palm and olive oil, wine and spirits, tobacco, etc. Cotton goods form by far the principal export; other exports are machinery, woolens, etc. Manufacturing industries are varied, and include engineering, iron and brass founding, chemicals, sugar refining, brewing, rope making, etc. Liverpool is the chief port in Britain for the departure of emigrants. There are five approaches to the town by railway, and by the opening of the tunnel under the Mersey the railway facilities have been materially increased. Liverpool is, next to London, the largest town in England. Pop. 517,951.

Livingston, EDWARD (1764 – 1836), statesman, was b. in Clearmont, N. Y. He was sent to Congress, from New York in 1794, serving until 1801; from Louisiana, from 1822 to 1829, being then elected U. S. senator. In 1831 he was secretary of state; in 1833 was minister to France. In an extended knowledge of law he had probably no superior.

Livingston, PHILIP (1716–1778), was b. in Albany, N. Y. He was an ardent patriot, sat in the provincial assemblies, and was a member of the continental congresses. He was one of the signers of the Declaration of Independence.

Livingstone, DAVID (1813–1873), missionary and African traveler, was b. at Blantyre, Lanarkshire, and d. near Lake Bangweolo, Africa. Under the auspices of the London Missionary Society he proceeded in 1840 to South Africa, where he joined Robert Moffat in the missionary field. His first station was in the Bechuana territory, and here his labors for nine years were associated with Mr. Moffat, whose daughter he married. Having heard from the natives that there was a large lake north of the Kalahari desert, he proceeded to explore that region, and discovered the valley of the Zouga and Lake Ngami. Subsequently he penetrated farther northwest until he reached Linyanti, the capital of the Makololo territory, situated on the Chobe, a tributary of the Zambesi, which river he also visited. In 1853–56 he made a great exploratory journey, or series of journeys. Starting from Linyanti he ascended the Leeambye (Upper Zambesi), journeyed overland to Lake Dilolo, and thence to St. Paul de Loanda on the west coast. Returning to Linyanti, he struck eastward from there in 1855, tracing the Zambesi to the Indian Ocean, and reaching the Quilimane on the east coast in 1856, having thus crossed the entire continent. The record of this journey is found in his *Missionary Travels and Researches in South Africa* (Lond., 1857). After making various journeys and exploring the Lake Ny-

assa and Zambesi region, Livingstone set forth in 1865 to set at rest the question of the sources of the Nile. From this time till his death he was engaged in laborious explorations in the lake region of South Africa, especially to the westward of Nyassa and Tanganyika, where he discovered lakes Bangweolo and Moero, the Upper Congo, etc. For about three years no communication had come from him, and the doubts regarding the traveler's safety were only set at rest when it was known that H. M. Stanley, the special correspondent of the New York *Herald*, had seen and assisted Livingstone, at Ujiji, on Lake Tanganyika. They parted in March, 1872, Livingstone going to explore the southern end of Tanganyika, and Stanley proceeding to Zanzibar. After another year's wanderings he was attacked with dysentery near Lake Bangweolo, and there he died. His body was buried in Westminster Abbey, having been conveyed to the coast, rudely preserved in salt. Pl. 28, Vol. III.

Liv'ius, TITUS, PATAVINUS (B.C. 59–), often called LIVY, a celebrated Roman historian, b. at Patavium (Padua). Nothing is known of his life except that he came to Rome, secured the favor of Augustus, and became a person of some consequence at court, that he was married, and had at least two children, and that he died in his native town, according to some authorities, A.D. 11, and to others, A.D. 16 or 17. His *Roman History* begins at the landing of Æneas in Italy, and comes down to the year of the city 744 (B.C. 9). His whole work consisted of 140 or 142 books, of which we have only the first ten, and those from the twenty-first to the forty-fifth, or the first, third, and fourth decades, and half of the fifth. Of all the books, however, except two, we possess short epitomes or tables of contents. In the first ten books the history extends from the foundation of Rome B.C. 753 to the year 294 B.C.; the portion between the twenty-first and forty-fifth books contains the account of the Second Punic War and the history of the city between B.C. 219 and 201. The fourth and the half of the fifth decade bring down the history to the year B.C. 167. Livy makes no pretensions to the character of a critical historian; his grand purpose was to glorify his country, and he adopted all the legends of the early history without troubling his mind about their authenticity.

Livy. See *Livius.*

Lizard is the popular English name of numerous reptiles having usually two pair of limbs and an elongated body terminating in a tail. The lizards number more than a thousand species, accommodating themselves to all conditions except cold, and increasing in size and numbers in tropical regions. In some the tongue is thick and fleshy and in others it is divided, while in most cases it is protrusible. Some lizards are vegetable feeders, but for the most part they are carnivorous and live upon small birds, insects, etc. The eggs are deposited and left to be hatched without care from the parents. Of the three species found in Great Britain the common lizard is the most widely distributed; the sand lizard is confined to portions of England, and the green lizard is found in the island of Guernsey. The chief families of lizards are the Sincidæ, or Skinks; the Geckotide, or Geckos; the Iguanidæ, or Igunanas; and the Chamæleonidæ or Chameleons. Poison glands are wanting in the lizards; the only exception being the *Heloderma* of Arizona and Mexico,

Common Lizard.

which is capable of inflicting a poisonous bite by means of poison glands connected with grooved teeth.

Llama (lä'ma or lyä'mä) (*Auchenia*), an ungulate ruminating quadruped found in South America, closely allied to the camel, and included in the family Tylopoda. They differ from the camel in having no hump upon the back, in having a deeper cleft between the toes, the callous pad of the foot is less developed, and the interval between the canine and

Llama.

the back teeth is greater. The tail being short and the hair long and thick, the llama has the general appearance of a long-necked sheep, standing about 3 ft. at the shoulder. Of the four known species the guanaco and the vicuña are found in a wild condition, while the llama and the alpaca have long been domesticated. The llama is used by the inhabitants of Chile and Peru to carry burdens after the manner

of a camel. When loaded with about a hundredweight it can travel some 14 miles a day across the mountain passes. They are gentle and docile creatures.

Llanel'ly, a parliamentary borough of South Wales, in Carmarthenshire, 14 mi. s. by e. of Carmarthen. It is the outlet for the products of extensive collieries, iron foundries, copper, tin, lead, and silver works, in which a large number of the inhabitants are employed.

Llanos (lyä'nōs), the Spanish name given to the vast plains situated in the n. part of South America, particularly in Colombia and the basin of the Orinoco. During the dry season the vegetation is burned up by the sun, while in the rainy period they are flooded with water. Between these two seasons the llanos are covered with thick grass and ranged by vast herds of cattle and horses. Farther s. such plains are called *pampas*, and in North America *savannas*.

Llanquihue (lyän-kē'wā), a southern province of Chile, situated between the Andes and the Pacific Ocean. Its area of nearly 8,000 sq. mi. is extremely fertile, yielding abundant harvests to its inhabitants, who are mostly Germans; capital, Puerto Montt. Pop. 68,580.

Lloyd's, an incorporated society of persons engaged in marine insurance in London, or otherwise connected with shipping, having rooms in the London Royal Exchange. Members are admitted by subscription, and the affairs of the institution are conducted by a committee. Reports are received daily from all foreign ports, and this information is posted in the common merchants' room. Besides this, there are other rooms for the use of the underwriters and for ship auctions, a library, restaurant, etc. Lloyd's List, containing shipping reports, is published daily, and Lloyd's Register of shipping is issued annually. Originally the London underwriters met at Lloyd's Coffeehouse, hence the name.

Loach, a small fish inhabiting small, clear streams in England, and esteemed dainty food. A smaller species, the spined loach or groundling (*C. tænia*), also occurs in England. The name is also given to the eel-pout, and the three-bearded rockling.

Loadstone (or Magnetic Iron Ore), a mineral consisting of a mixture of the ferric and ferrous oxides, remarkable for its highly magnetic quality. The name loadstone or lodestone ("leading-stone") is derived from its power of drawing or leading bits of iron; the earliest magnets were pieces of loadstone, and the value of the ore for making a mariner's compass was early known: "the lodestarre [polestar] draweth the lodestone as the lodestone the steel." Loadstone is black, and has a metallic luster; its hardness = 5.5 to 6.5, and its specific gravity = 4.9 to 5.2. It is one of the most common constituents of eruptive rocks, occurring in these generally in the form of small octahedra or irregular grains. Some rocks, such as certain basalts, contain so much magnetite as strongly to affect the compass. Larger and well-defined crystals are met with in the crystalline schists, more especially in chlorite-schist. Magnetite also occurs massive, associated with other iron ores, forming in some places irregular bedded sheets among the crystalline schists, and in other places entering largely into the composition of mountains, as in Sweden—one of the richest iron-bearing regions in the world. The iron-sands which occur here and there in river beds and along certain sea coasts, consist of magnetite which has been derived from the degradation of eruptive rocks.

Many strange beliefs have been held about the properties of the loadstone. Thus, one species was said to attract flesh; again, its operation was hindered by garlic, by the diamond, by quicksilver. Heavy bodies such as chariots of iron could be suspended in the air by systems of magnets arranged. Again, it possessed valuable medicinal properties in cases of dropsy, ruptures, and gout; and had, moreover, magical efficacy to detect incontinence and theft, to divine, and to afford means of communication with absent friends.

Loam, a soil compounded of various earths, of which the chief are sand, clay, and carbonate of lime or chalk, the clay predominating. Decayed vegetable and animal matter, in the form of humus, is often found in loams in considerable quantities, and the soil is fertile in proportion.

Loan, anything lent or given to another on condition of return or payment. In law loans are considered to be of two kinds—*mutuum* and *commodate;* the former term being applied to the loan of such articles as are consumed in the use, as provisions or money; the latter to the loan of such articles as must be individually returned to the lender. The acknowledgment of a loan of money may be made by giving a bond, a promissory note, or simply an I. O. U.

Lobe'lia (named after Matthew Lobel, physician and botanist to James I), a very extensive genus of beautiful herbs, natives of almost all parts of the world, especially of the warmer parts of America, tribe Lobeliaceæ, natural order Campanulaceæ. *L. inflāta* is the Indian tobacco, which is cultivated in North America, and is employed in medicine. The small blue lobelia so popular in gardens is a Cape species. A brilliantly scarlet-flowered species, is the cardinal-flower. *L. siphilitica*, an American species, possesses emetic, cathartic, and diu-

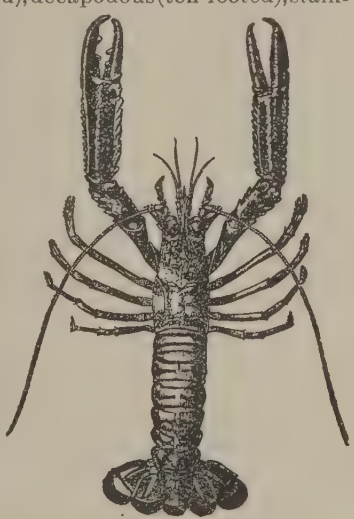
Lobelia.

retic properties. Two species are found wild in Britain.

Loblolly Bay, the popular name of an elegant ornamental evergreen tree of the maritime parts of the southern U. S., having large and showy white flowers. It grows to the height of 50 or 60 ft.

Loblolly Pine, an American pine, next to the white pine the loftiest in North America. Its leaves are 6 in. long, united by threes or fours. Its timber is of little value.

Lobster, the common name of the macrurous (long-tailed), decapodous (ten-footed), stalk-eyed crustaceans, belonging to the genus *Homărus*. The first pair of ambulatory limbs bear the well-known and formidable lobster claws. The abdomen has rudimentary limbs on its under side, among which are lodged the newly excluded spawn. The tail consists of several flat shelly plates capable of being spread like a fan, and used as a swimming organ. They inhabit the clearest water, living in the crevices of a rocky bottom. The common lobster is found in great abundance on many of the European shores. Lobsters are esteemed a very rich and nourishing aliment, but dangerous unless fresh and in good condition. They are generally in their best season from the middle of October till the beginning of May. *H. americānus*, closely allied to the British lobster, is found on the coasts of North America. The fresh-water lobster is the crawfish or crayfish.



Norway Lobster.

Lobworm, a genus of worms. It has a round, obtuse head, a body about the size of a large earthworm, and respires through thirteen pairs of gill-tufts. Traces of the lobworm may be found on every sea beach in the little coils of sand which it leaves when burrowing after the tide has ebbed. It is used for bait in deep-sea fishing. It is called also *Lugworm*.

Local Option, a term applied to the principle by which a certain majority of the inhabitants or ratepayers of a certain locality may decide as to whether any, or how many, shops for the sale of intoxicating liquors shall exist in the locality. This principle operates in several of the American states.

Lock, an enclosure in a canal, with gates at each end, used in raising or lowering boats as they pass from one level to another. When a vessel is descending, water is let into the lock till it is on a level with the higher water, and thus permits the vessel to enter; the upper gates of the lock are then closed, and by the lower gates being gradually opened, the water in the lock falls to the level of the lower water, and the vessel passes out. In ascending the operation is reversed, that is, the vessel enters the lock, the lower gates are closed, and the water is admitted by the upper gates, which, as it fills the lock, raises the vessel to the height of the higher water.

Lock, an appliance used for fastening doors, chests, drawers, etc. A good lock is the masterpiece in smithery, and requires much art and delicacy in contriving and varying the wards, springs, bolts, and other parts of which it is composed. The principle upon which all locks depend is the application of a lever to an interior bolt, by means of a communication from without, so that by means of the latter the lever acts upon the bolt, and moves it in such a manner as to secure the door or lid from being opened by any pull or push from without.

Locke, David Ross (1833–1888), was b. in New York state. He learned the printer's trade, and became connected with several newspapers. He became famous because of the political satires published under the *nom de plume, Petroleum V. Nasby*.

Locke, John (1632–1704), eminent English philosopher b. at Wrington, in Somersetshire. He was sent to Westminster School; from there he went to Christ Church, Oxford, where he took the degrees B. A. and M. A. and applied himself to the study of medicine. So early as 1670 Locke had formed the plan of his famous *Essay on the Human Understanding*, and which he published in its completed form in 1690. It was received with much opposition, notably by the University of Oxford, who resolved to discourage it; but despite this it acquired a great reputation throughout Europe. Locke was made a commissioner of trade and plantations in 1695, but retired when unable to perform its duties, and lived with his friend Sir F. Masham until his death. Briefly, it may be stated that the chief purpose of Locke's celebrated *Essay* was to find the original sources and the scope of human knowledge. The conclusions he arrived at were that there is no such thing as an "innate idea;" that the human mind is a sheet of white paper prepared to be written upon; that the knowledge thereon written is supplied by experience; and that "sensation" and "reflection" are the two sources of all our ideas. Among other works of Locke are three *Letters on Toleration; Thoughts concerning Education; Reasonableness of Christianity;* two *Treatises on Government; Notes upon St. Paul's Epistles to the Galatians, Corinthians, Romans, and Ephesians;* and a *Treatise on the Conduct of the Understanding*.

Lockhart, John Gibson (1794–1854), author, and editor. He was educated at Glasgow University; studied for the Scottish bar but never practised; and began his literary career in 1817 as a contributor to *Blackwood's Magazine*. In 1820 he married the daughter of Sir Walter

Scott, and in 1826 succeeded Mr. Gifford as editor of the *Quarterly Review*. He wrote a life of Sir Walter Scott.

Lock Haven, county seat of Clinton co., Pa., 28 m. s. w. of Williamsport. on the Susquehanna river, the Pennsylvania Canal and branches of the Beech Creek and the Pennsylvania railroads. It is in an agricultural and lumber region. Its industries include tanneries, planing mills and foundries; firebrick, sewer-pipe and clay works; machine shops, cigar factories, a paper mill and a silk mill. Lock Haven has a good library, a hospital, and a fine courthouse. It is the seat of the Central State Normal School. The charming scenery about Lock Haven attracts many summer visitors. Pop. 1900, 7,210.

Lockport, county seat of Niagara co., N. Y., 25 m. n. by e. of Buffalo; on the Erie Canal, and on the Erie and the N. Y. Cent. & Hud. Riv. railroads. It is situated at the point where the Erie Canal descends by a double tier of five locks from the level of Lake Erie to the Genesee level. The canal is here crossed by the N. Y. Cent. R. R. bridge. The locks may be seen from the train. By means of them an immense water-power is obtained for manufacturing purposes. Lockport is famous for its limestone quarries and manufacture of flour. Other industries are the manufacture of Holly waterworks machinery, milling machinery, pulp and paper, indurated fibre products, aluminum, glass and brooms. The city has a large trade in grain and fruits. The town was settled in 1825. Pop. 1900, 16,581.

Locust.

Lock'yer, Joseph Norman, F. R. S. (1836–), English astronomer, b. at Rugby and educated privately. He entered the War Office in 1857; became astronomical lecturer at South Kensington, and directed the eclipse expedition to Sicily in 1870, and to India in 1871. He is best known as a popular lecturer on science, and in connection with his discoveries in spectrum analysis. His contributions to literature include *Elementary Lessons in Astronomy* (1868), *Studies in Spectrum Analysis* (1872), *Solar Physics* (1874), *Star Gazing* (1877), *The Chemistry of the Sun* (1887), etc.

Locomotor Ataxia, a disease of the nervous system, characterized by a loss of the power to order harmoniously the muscles that move the body and maintain equilibrium.

Locust, the name of several insects allied to the grasshoppers and crickets. Their hind legs are large and powerful, which gives them a great power of leaping. Their mandibles and maxillæ are strong, sharp, and jagged, and their food consists of the leaves and green stalks of plants. They fly well, but are often conveyed by winds where their own powers of flight could not have carried them. The most celebrated species is the migratory locust. It is about 2½ in. in length, greenish, with brown wing-covers marked with black. Migratory locusts are most usually found in Asia and Africa, where they frequently swarm in countless numbers, darkening the air in their excursions, and devouring every blade of the vegetation of the land they light on. They are destructive both in the larval, nymph, and perfect conditions. The Arabs and others use them as food. When dried in the sun, they are pounded up and baked into bread, or fried in oil as a delicacy. In America locusts are usually known as "grasshoppers." There are two specially destructive species, one of which, *Caloptēnus femurrubrum*, is found in Northern New England and Canada; and the other, *Caloptenus spretus*, breeds abundantly west of the Mississippi. In the summer months this latter species commits widespread ravages in Texas, Kansas, and Colorado.

Locust Tree (or Acacia), is found in the Eastern states but grows to its best in Kentucky and Tennessee. There it acquires a girth of 4 ft., and a height of 80 ft. The leaves are pinnate, smooth, prickly at the base; the flowers grow in pendulous racemes, white, fragrant, and producing smooth pods. The wood of the locust tree is highly valued for certain purposes, being close grained, tough, light, and elastic in the best variety; it is reddish tinted. It is used for house work, fences, railway sleepers, cabinet making, etc.

Lodge, Henry Cabot (1850–), congressman and author, was b. in Boston, Mass. He graduated from Harvard Law School in 1875 Distinguished as a writer on economic, financial, and commercial subjects. He was elected senator in 1893. and in 1899.

Lodger, is a tenant who holds part of a house in his exclusive possession, while the landlord or his agent holds possession over the house as a whole.

Lodz (Russian *Lodsi*), a town in Russian Poland, in the government of Piotrokow, 76 mi. s.w. of Warsaw, and next to it the most populous town in Poland. It has extensive trade and manufactures, especially in woolens and cottons. Pop. 113,413.

Log, a contrivance used to measure the rate of a ship's velocity through the water. For this purpose there are several inventions, but the one most generally used is the following, called the *common log*. It is a piece of thin board, forming the quadrant of a circle of about 6 in. radius, and balanced by a small plate of lead nailed on the circular part, so as to swim perpendicularly in the water, with the greater

part immersed. One end of a line called the *log-line*, is fastened to the log, while the other is wound round a reel. When the log is thrown out of the ship while sailing, as soon as it touches the water it ceases to partake of the ship's motion, so that the ship goes on and leaves it behind, while the line is unwound from the reel, so that the length of line unwound in a given time gives the rate of the ship's sailing. This is calculated by knots made on the line at certain distances, while the time is measured by a sand-glass running a certain number of seconds. The length between the knots is so proportioned to the time of the glass that the number of knots unwound while the glass runs down shows the number of nautical miles the ship is sailing per hour. Thus, if the glass be a half-minute one, it will run down 120 times in an hour. Now, since a nautical mile contains about 6,076 ft. the 120th part of this is about 50⅔ ft; so that if the spaces between the knots be 50⅔ ft., the number of knots and parts of a knot unwound from the reel in half a minute is the number of miles and parts of a mile the ship runs in one hour.

Logan, JOHN A. (1826–1886), statesman and soldier, was b. in Jackson co., Ill. In the Mexican War he did good service. In 1858 and 1860 was elected to Congress. In the Civil War his services were most important, he being engaged in many battles, and being promoted from colonel to commander of a corps. In 1866 he was re-elected to Congress, serving until 1871, when he became U. S. senator. In 1884 he was republican candidate for the vice-presidency. General Logan was a man of immense force in a legislative body. In debate he was aggressive and effective.

Logania'ceæ, a natural order of tropical dicotyledonous plants.

Logansport, county seat of Cass co., Ind., at the junction of the Wabash and the Eel rivers; 70 m. n. of Indianapolis. Railroads: P. C. C. & St. L., the Pennsylvania and the Wabash. It has valuable timber and building stone in the vicinity and is near the natural gas belt. It manufactures galvanized iron, linseed oil, wind pumps, flour, paper, and plow handles and has an extensive trade in grain, pork and lumber. Pop. 1900, 16,204.

Logarithms.—The common logarithm of a number is the index of the power to which 10 must be raised to be equal to the number. Thus $10^3 = 1000$, so that the logarithm of 1000 (usually written log. 1000) is 3. Now $10^1 = 10$, $10^2 = 100$, $10^3 = 1000$, $10^6 = 1{,}000{,}000$, and it is well known that $10^0 = 1$, $10^{-1} = 0.1$, $10^{-2} = 0.01$, etc., thus—

Log.	$0.001 = -3$	Log.	$10 = 1$
Log.	$0.01 = -2$	Log.	$100 = 2$
Log.	$0.1 = -1$	Log.	$1{,}000 = 3$
Log.	$1 = -0$	Log.	$10{,}000 = 4$

It is evident that the logarithm of any number greater than 1 and less than 10 is fractional; the logarithm of any number greater than 10 and less than 100 is greater than 1 and less than 2. Again, the logarithm of any number less than 1 is negative. Suppose we wish to know the logarithm of the number 18.1. In a book of tables we only find the fractional part of the logarithm; it is .257679. Now 18.1 is greater than 10 and less than 100, so that its logarithm is greater than 1 and less than 2; hence log. $18.1 = 1.257679$. The integral part of a logarithm is called its *characteristic*, the fractional part its *mantissa*. Logarithms make arithmetical computations more easy, for by means of a table of them the operations of multiplication, division, involution or the finding of powers, and evolution or the finding of roots, are changed to those of addition, subtraction, multiplication, and division respectively. For instance, if x and y are the logarithms of any two numbers; the numbers are 10^x and 10^y; now the product of these numbers is 10^{x+y} so that the logarithm of the product of two numbers is the sum of the logarithms of the numbers. Again the quotient of the numbers is 10^{x-y}; so that the logarithm of the quotient of two numbers is the difference of the logarithms of the numbers. Again 10^x raised to the nth power is 10^{nx}; so that the logarithm of the *nth* power of a number is n times the logarithm of the number. Logarithms of this kind are *common logarithms*, and were invented by Briggs; their *base* as it is called, is 10. Logarithms were first used by Napier of Merchiston (see *Napier, John*), and he employed a base which is smaller than 10, namely, the number 2.7185818...., or the sum of the infinite series $2 + \frac{1}{2} + \frac{1}{2.3} + \frac{1}{2.3.4} +$ etc. This base is denoted by ε in mathematical treatises, and the *Napierian* logarithm of any number, say 7, is $\log^{\varepsilon} 7$, to distinguish it from log. 7, which is the common logarithm, whose base is 10. The common logarithm of a number is found from the Napierian by multiplying by 0.43429448. Napierian logarithms are of great importance in the higher mathematics.

Log Book, a book kept in ships and into which the direction of the wind, course of the ship, state of the weather at all hours of the day, are daily transcribed at noon, together with every circumstance deserving of notice that may happen to the ship or within her cognizance, either at sea or in a harbor, etc.

Loggia (loj'å), a word used in Italian architecture with several significations. First, it is applied to a hall open on two or more sides, where there are pillars to support the roof, such as the Loggia de Lanzi in Florence. It is also applied to an open colonnade or arcade surrounding a court, or to an open gallery at the height of one or more stories in a building as seen in the figure. The name loggia is also given to the large ornamental window, consisting of several parts, which is often seen in old Venetian palaces; and lastly, it is used to designate a small airy hall, usually open on all sides, constructed on the roof of an edifice.

Logic, a department or division of mental science which has been differently defined by authorities. The older schools of logicians agreed on the whole in considering it as mainly treating of reasoning and the operations of mind subsidiary to reasonings; and this definition sufficiently indicates the view of the

science held by such logicians as Whately and Hamilton. According to them logic dealt only with the *form* of thought, that is, with what is common to all reasonings, judgments, and concepts respectively; and had nothing to do with the *matter*, that is, the subject or content of reasonings, judgments, etc. In this view the science of logic was merely *deductive*, and the syllogistic process, or the intellectual act performed in deducing particular truths from general truths already given, was the main subject of the science. It is evident, however, that in practical research there is another movement or process of the mind of at least equal importance, viz., the process by which the mind reaches general truths from the observation of particulars. This latter is the *inductive* process, and on it, regarded as the more important element in inference and the ascertainment of truth, John Stuart Mill founded his new system of *inductive logic*. The nature of scientific evidence, the methods and principles involved in scientific research, are the chief subjects of study in this system of logic. Very different from both of these are the conceptions of logic given by the chief German philosophers. Kant, in declaring that only the matter (not the form) of experience was given to the mind, had recognized thought as the essential factor of cognition, and had initiated a new so-called *transcendental logic:* which was an analysis of the general conditions under which the objective world became cognizable. Thus the foundation was laid for a view of reality as in its very nature constituted by thought. Thought or the *ego* is itself the real, and there being no separate reality logic becomes the system of the forms in and through which thought or intelligence is realized. Logic thus appears, as in Hegel, a complete theory of knowledge and a metaphysic. The earliest work on logic is the *Organon of Aristotle*, who practically gave the science the shape it possesses.

Logograph'ic Printing, a contrivance in printing in which words or parts of words are cast as types instead of single letters. It was tried in the London *Times* printing office, but was not successful. A simplified system of types, however, consisting of single oft-recurring syllables or parts of words, has been elaborated, but has found as yet no general acceptance.

Logoma'nia, a disease of the faculty of language generally associated with organic disease of the nervous structure, as in paralysis. In this disease, while conceptions and ideas remain clear, the power of associating these with the words by which they are expressed is lost, and the patient can either not give any names to his conceptions at all or expresses them erroneously. Sometimes one class of words is lost and others retained. Thus a patient may forget his own name, or nouns only, and remember all other words. Sometimes he forgets only parts of the word, as terminations, and not infrequently in another form of the disease he inverts his phrases.

Logwood, a popular name for a tree which grows in moist and swampy places in Central America, and particularly round the Bay of Campeachy; but is now naturalized in Jamaica and many of the West Indian islands. The tree is usually from 40 to 50 ft. high, with pinnate leaves and small yellowish flowers. The wood is red in color, tinged with orange and black, so heavy as to sink in water, and susceptible of receiving a good polish. It is used chiefly as a dyewood, the trees being cut down, the bark and alburnum removed, and the hard center parts cut into 3-foot-long logs. To obtain the coloring matter it is hewn into much smaller pieces, and ground or rasped to smaller chips, or to a coarse powder. The aqueous extract is muddy and of a reddish-brown color. By acids the red color is made paler; by alkalies it is converted to purple. By mordanting the fabric with iron, black is produced; with alumina, violet and lilac; with copper, blue; and with chromium, a black or green. The coloring powder of logwood depends chiefly on a crystalline ingredient called hæmatoxylin. It is employed in calico printing to give a black or brown color, and also in the preparation of some lakes. An extract of logwood is used in medicine as an astringent.

Loh'engrin, the hero of a German poem of the end of the thirteenth century, represented as the son of Parsifal and one of the guardians of the Holy Grail. Sent by King Arthur to help the Princess Elsa of Brabant, he arrives in a vehicle drawn by a swan, delivers the princess from captivity, and marries her; accompanies the emperor in a campaign against the Hungarians, and fights against the Saracens. He then returns to his bride at Cologne, but being pressed by her to state his origin he is prevailed upon to tell it, after which he must, in terms of his vow, return home to the Grail. The legend has been made the subject of a well-known opera by Wagner.

Loire (lwär) (anc. *Liger*), the largest river of France, which it divides into two nearly equal portions. Its whole course is about 645 mi., of which about 450 mi. are navigable.

Loire, a central department of France; area 1,837 sq. mi. A good deal of wine is produced, but ranks only as a *vin ordinaire* of good quality. Coal is mined to a large extent, part of the department being in the coal field of the Loire, the most important in France. Iron is smelted, and extensively manufactured into steel and articles of hardware, etc., employing 25,000 hands; silk, ribbons, velvet, etc., are also made, the silk manufacture alone employing about 12,000 workers. The capital and great center of industry is St. Etienne; other towns are Roanne and Montbrison. Pop. 603,384.

Loire, Haute- (ōt-lwär) (Upper Loire), a department of Southeastern France; area 1,915 sq. mi. The mountains are generally covered with forests, in which wild boars, wolves, foxes, deer, etc., abound, or with verdant pastures, on which herds of cattle are reared. Some wine is produced; but the chief industry is the manufacture of various sorts of lace, largely a

home industry. Le Puy is the capital. Pop. 320,063.

Loire-Inférieure (lwär-an-fā-ri-*eur*) (Lower Loire), a western maritime department of France; area 2,653 sq. mi. The soil is generally productive, yielding grain, sugar beet, and large quantities of wine. The oak forests pasture great numbers of swine. Shipbuilding and the allied trades are carried on to a considerable extent. Smelting furnaces, machine works, sugar refineries, are also in operation. To these may be added tanneries, glass works, potteries, paper mills, etc. Wine, salt, corn, cattle, etc., are exported. The principal ports are Nantes and St. Nazaire. Nantes is the capital. Pop. 643,884.

Loiret (lwä-rā), a central department of France; area 2,614 sq. mi. The chief products are grain and wine. Pottery and porcelain are the chief manufactures. Orleans is the chief town. Pop. 374,875.

Loir-et-Cher (lwär-ā-shār), a central department of France; area 2,451 sq. mi. Cereals of all kinds, hemp, beet root for sugar, wine, fruits are produced, and horses, cattle, and sheep are reared on excellent pastures. The capital is Blois. Pop. 279,214.

Lok (or Loki), in Scandinavian mythology the evil deity, father of Hel or Hela, goddess of the infernal regions. He is a personification of evil, described as of handsome appearance, but perpetually engaged in works of wickedness partly directed against the other gods.

Lokman', a name that figures in the traditions of the Arabians as that of a sage or prophet. In the Koran there is an account of a Lokman the Wise who lived at a time anterior to that of King David. He is represented as the author of a collection of fables, which, however, are of a later date than the first century of the Heira.

Lollards, a name which arose in the Netherlands about the beginning of the fourteenth century, and was applied as a term of contempt to various sects or fraternities deemed heretical, being probably derived from the Low German *lollen*, to sing in a low tone. The name became well known in England about the end of the fourteenth century, when it was applied to the followers of Wickliffe, and to others more or less influenced by his teaching. The Wat Tyler revolt of 1381 was directly connected with Lollardism, and latterly the Lollards drew upon themselves the enmity of the civil powers, and numbers of them were put to death, especially during the reign of Henry V, when apparently another revolt was intended.

Lombard, PETER (or Petrus Lombardus) (1100–1164), one of the most celebrated of the schoolmen, b. near Novara, in Lombardy. He was a scholar of Abelard in the University of Paris, became a teacher of theology, and at last, in 1159, bishop of Paris, where he seems to have died. His work, *Sententiarum Libri Quatuor* is a classified collection of the opinions of the fathers on points of doctrine, with a statement of the objections made to them, and the answers given by church authorities. Hence he is known as the Master of Sentences.

Lombard Architecture, the form which the Romanesque style of architecture assumed under the hands of the Gothic invaders and colonists of the n. of Italy, comprising the buildings erected from about the beginning of the ninth to the beginning of the thirteenth century. The most characteristic feature of the churches built in this style is the general introduction and artistic development of the vault, that feature which afterward became the formative principle of the whole Gothic style. The tendency to the prevalence of vertical lines throughout the design, instead of the horizontal lines of the classic architecture, is also characteristic, as well as the use of the dome to surmount the intersection of the choir, nave, and transepts. Mr. Fergusson remarks: "Generally speaking the most beautiful part of a Lombard church is its eastern end. The apse with its gallery, the transepts, and, above all, the dome that almost invariably surmounts their intersection with the choir, constitute a group which always has a pleasing effect, and is very often highly artistic and beautiful." As examples of Lombard architecture may be mentioned the church of St. Michael, Pavia; San Zenoni, Verona; and the atrium of San Ambrogio, Milan.

Lom'bards (Longobardi or Langobardi; so called either from the *long barte* or spear which they carried, or from the *long beards*), a Germanic or Teutonic people who at the beginning of the Christian era were dwelling on the Lower Elbe. They make little appearance in history till the sixth century, when, under their king Alboin, they entered Italy in April, 568, and, with the help of Saxons and others, conquered the northern portion, which hence received the name of Lombardy. Alboin was assassinated in 573, and after some years of great confusion Autharis was recognized in 585 as king. He married Theodelinde, a Frankish princess, who began the process of converting the Lombards from Arianism to the orthodox faith. The only king of note among the successors of her family was Rothari, who in 643 promulgated a system of laws, which, with subsequent additions, became among German jurists the basis of the study of law during the Middle Ages. From 713 to 744 the Lombards had a powerful king in the person of Liutprant, who extended his sway, at least temporarily, over the whole of Italy. From that time the power of the Lombards gradually declined and finally Charlemagne captured Pavia after a six months' siege, and put an end to the Lombard kingdom (773 or 774), the last monarch being Desiderius.

Lom'bardy, the part of Upper Italy which took its name from the Lombards and which at first extended from the Adriatic to the Savoyan Alps. Lombardy is now the name of an Italian department (compartimenti), embracing eight provinces (Bergamo, Brescia, Como, Cremona, Mantua, Milan, Pavia, and Sondrio), containing an area of 9,086 sq. mi. and a pop. of 3,872,792.

Lombok, an island, belonging to the Dutch,

in the Indian Archipelago. It lies between Bali on the west and Sumbawa on the east, and has an area of 2,393 sq. mi. The ruling class are Brahmans, but the mass of the population is Mohammedan. The capital is Mataram on the west coast. Pop. 405,000.

Lomond, Loch, a beautiful lake of Scotland, renowned for its scenery, lying within the counties of Stirling and Dumbarton.

Lomza, a town of Russian Poland, capital of the government of the same name, on the Nareff, 80 mi. n.e. of Warsaw. Pop. 15,000. The government of Lomza covers an area of 4,670 sq. mi., mostly of a flat and fertile soil. Pop. 608,683.

Lonaconing, Alleghany co., Md., 18 mi. w. of Cumberland. Railroads: Cumberland & Pa., and George's Creek & Cumberland. Coal mining is the chief industry. Surrounding country agricultural and mineral. The town was first settled in 1832.

London, the capital of the British Empire and the largest city in the world, is situated in the southeast of England on both sides of the river Thames, which winds through it from west to east. It stretches from east to west about 14 mi., from north to south about 10. Pop. in 1901, 6,578,784. The area embraced by the metropolitan and city police districts, including all parishes within 15 mi. of Charing Cross—the official center of the metropolis—is also spoken of as London: it covers 441,559 acres, or 688 sq. mi.; pop. in 1891, 5,633,332. The city proper is a separate municipality, having a civic corporation of its own, at its head being the lord mayor of London, occupies only 668 acres, and has a resident population of 37,504. Westminster, associated with the sovereigns and parliaments for over 800 years, borders with the city on the west: while across the river from the city lies the ancient quarter of Southwark, or "The Borough."

As the capital of the British Empire London is from time to time the residence of the sovereign and court. It contains the Houses of Parliament and all the great government departments. It is the chief intellectual center of Britain, if not of the world, and is equally great as a center of commerce, banking, and finance generally.

Important Streets.—The whole extent of the metropolis is well united by trunk lines of streets in the principal directions. Piccadilly and Pall Mall; the Strand and its continuation, Fleet Street; Oxford Street and its continuations, Holborn, Holborn Viaduct, and Cheapside, are among noteworthy streets running east and west; while of those running north and south, Regent Street, perhaps the handsomest street in London, and the location of fashionable shops, is the chief. The Thames embankment on the north or Middlesex side, known as the Victoria Embankment, also forms a magnificent thoroughfare, adorned by important buildings, and at different points with ornamental grounds and statues.

Parks and Squares.—The chief parks are in the western portion of the metropolis, the largest being Hyde Park and Regent's Park, which, together with St. James's Park and the Green Park, are royal parks. The most fashionable is Hyde Park, containing about 400 acres. It is surrounded by a carriage drive 2½ mi. long. St. James's Park, 83 acres, and the Green Park, 71 acres in extent, adjoin Hyde Park on the southeast. Regent's Park, in the northwest of London, north of Hyde Park, containing the gardens of the Zoological Society and those of the Royal Botanic Society, covers an area of 740 acres. The Zoological Gardens contain the largest collection in the world.

Monuments.—Among the public monuments are that on Fish Street Hill, 202 ft. high, erected in 1677 in commemoration of the great fire of London; the York Column, in Waterloo Place, 124 ft. high; the Guards' Memorial (those who fell in the Crimea), same place; the Nelson Column, in Trafalgar Square, 176½ ft. high; the national memorial to Prince Albert in Hyde Park, probably one of the finest monuments in Europe; Cleopatra's Needle on the Thames Embankment, etc.

Public Buildings.—Among the royal palaces are St James's, erected by Henry VIII; Buckingham Palace, built by George IV; Marlborough House, the residence of the Prince and Princess of Wales; Kensington Palace, the birthplace of Queen Victoria, and others. On the north bank of the Thames stand the Houses of Parliament, a magnificent structure in the Tudor Gothic style, with two lofty towers. The buildings cover about 8 acres, and cost £3,000,000. Adjoining the city on the east is the Tower, the adjacent citadel of London, which occupies an area of 12 acres on the banks of the Thames. The most ancient part is the White Tower, erected about 1078 for William the Conqueror. One of the most important of recent public buildings is the new Law Courts, a Gothic building at the junction of the Strand and Fleet Street. Other noteworthy buildings are the Bank of England; the Royal Exchange; the Mansion House, the official residence of the lord mayor; the Guildhall, the seat of the municipal government of the city; the four Inns of Court (Inner and Middle Temple, Lincoln's Inn, Gray's Inn), etc.

Churches.—Among the churches the chief is St. Paul's Cathedral, completed in 1710 by Sir Christopher Wren. It is a classic building, 510 ft. in length, with a dome 400 ft. in height. Westminster Abbey, one of the finest specimens of the pointed style in Great Britain, dates from the reign of Henry III and Edward I. It adjoins the Houses of Parliament, is 531 ft. long, including Henry VII's chapel, and 203 ft. wide at the transepts. In the south transept are the tombs of great poets from Chaucer down; whence it is called "Poets' Corner;" and in other parts are numerous sculptured monuments to sovereigns, statesmen, etc.

Museums, etc.—Among museums and galleries the principal is the British Museum, the great national collection, in a very central position as regards the rest of the metropolis.

PARLIAMENT HOUSES
THAMES EMBANKMENT

The South Kensington Museum is a capacious series of buildings containing valuable collections in science and the fine and decorative arts, and there is a branch museum from it in Bethnal Green, in the East End. The natural history department of the British Museum occupies a fine Romanesque building at South Kensington.

Sanitary Condition, etc.—London is the healthiest city of the world, the annual death rate per thousand being in recent years about 20.5. The sewerage system is necessarily gigantic, there being altogether about 250 miles of sewers. There is no single system of water supply, the water being furnished by several companies from the Thames, the Lea, and other sources. The chief supply is that brought by the New River Company established in the time of James I, and obtaining its supply partly from springs and artesian wells, but mainly from the river Lea at Hertford. These companies have a total capital of about £14,000,000. The gas is also supplied by several companies, their capital amounting to about £13,000,000.

Population.—The population of London has multiplied sixfold since 1801. From 1881 to 1891 it increased at the rate of about 30,000 annually. About one third of the inhabitants were born outside the limits of London; among these there are natives of all parts of the world. The Irish are said to number more than 250,000, the Scots about half as many, the Germans 60,000 or 70,000, the French 30,000 to 40,000, the Jews 40,000.

Civic Administration.—By the Government Act which went into effect Nov. 1, 1900, the government of that portion of the city outside of London proper has been very much simplified by consolidation. Heretofore this outlying portion has been governed by more than 500 public bodies having a total membership of over 10,000. By the new law these boards are abolished and the city is divided into 28 boroughs or municipalities governed by borough councils. Each council is to consist of a mayor, not more than 10 aldermen, and not more than 60 councillors. One-third of the councillors may be elected each year or all of them every three years. The system of taxation is simplified by combining the taxes for various purposes into one tax. The London County Council is retained.

History.—In the reign of Claudius (41-54 A.D.) the southern part of Britain was made a Roman province, and London became a Roman station. In the time of Constantine, about 306, the Romans fortified and walled it, and it eventually became a great commercial city. At the Conquest London submitted to William, and received from him a charter, which is still preserved. It also obtained charters from Henry I, Stephen, Richard I, and John. In the fifteenth century some of the principal streets were paved; the plague of sweating sickness raged in several years of this century. The great plague, which lasted from December, 1664, to January, 1666, carried off about 69,000 persons. In 1666 the great fire broke out, and spread over 336 acres, destroying 14,200 houses, ninety churches, and many public buildings. Population and trade now rapidly increased. In the middle of the century the population was about 600,000. In 1759 the British Museum, founded on Sir Hans Sloane's collections purchased by the government, was opened. About this time the houses began to be numbered and the names of streets marked at the corners. In 1781 the Gordon riots took place, when the mob were in possession of London for two days, and committed great havoc. In 1834 the old Houses of Parliament were burned down; the present buildings were begun in 1840. In 1851 the great international exhibition was held in Hyde Park, and led to numerous exhibitions of a similar kind. Since then the history of London has been a story of continued growth and progress, the most notable improvements being the formation of the Thames embankment and the Holborn viaduct.

London, a town of Canada, the capital of Middlesex co., Ontario, on the Thames and the Great Western Railway, 121 mi. w. of Toronto. There are extensive oil-refining works, iron foundries, chemical works, and other manufacturing establishments. It is in the center of a fine agricultural region, and carries on active trade in wheat and agricultural produce. Pop. 1901, 37,983.

London, UNIVERSITY OF, was originally established as a joint-stock undertaking in 1825. In 1836 two charters were granted, one to a university retaining the name of London University, and having power to examine and grant degrees, another to a teaching body occupying the original premises at Gower Street, which took the name of University College, and now prepares students for obtaining the degrees conferred by the university. New and supplementary charters were granted in 1858, 1863, and 1878, the last admitting women to all degrees and prizes granted by the university. The university admits as candidates for examination any person who is above 16 years of age, and confers degrees in all departments of knowledge except theology, including the degrees of Bachelor, Master, and Doctor, in Arts (or Literature), and Bachelor and Doctor in Laws, Science, Medicine, and Music.

London Clay, the most important of the Eocene tertiary formations of Great Britain, largely developed in the valley of the Thames under and around the metropolis. This formation consists of a bluish or brownish clay containing layers of argillaceous nodular limestone. The shells, fruits, etc., found in the London clay mostly belong to genera now inhabiting warmer seas than those of Britain.

Londonderry, a city and seaport in the north of Ireland, capital of the county of the same name, on the river Foyle. An extensive trade is carried on, linen is manufactured, and there are shirt factories, timber mills, grain mills, foundries, distilleries, etc.

London Pride, a perennial evergreen plant of the saxifrage order common in Britain. It has flower stems 6 to 12 in. high, with small spotted pink flowers. It is also known by the

name of None-so-pretty, and in Ireland as St. Patrick's Cabbage.

Long, JOHN D., lawyer, b. in Maine in 1835. In 1857 he graduated at Harvard. After studying law he was admitted to the bar in 1861. He was elected to the state legislature and made speaker of the house. He was governor of Massachusetts for three consecutive terms and afterward elected to Congress. He was appointed secretary of the navy by President McKinley in 1897.

Long, LOCH, a narrow picturesque arm of the sea in Scotland, stretching with a slight curve n. and n. e. from the Firth of Clyde for about 16 mi. between the counties of Argyle and Dumbarton.

Longan, an evergreen Eastern tree, a native of the south of China, yielding a delicious fruit. It is of the same genus with the litchi, but its fruit is brown and smaller, being about 1½ in. in diameter. It is grown to some extent in European hothouses.

Long Bow. See *Bow.*

Long Branch, Monmouth co., N.J., on Atlantic Ocean and Shrewsbury River, 40 mi. s. of New York City. Railroads: N. Y. & L. B.; Pennsylvania; N. J. Central; N. J. Southern; Atlantic Coast Electric; Long Branch Electric. Industries: lumber and planing mills, flouring mill, shirt, dust pan, asphalt, and other factories. Surrounding country agricultural. The town was first settled in 1734, and became a city in 1867. Pop. 1900, 8,872,

Longfellow, HENRY WADSWORTH (1807–1882), an American poet; b. at Portland, Maine. His mother, Zilpha Wadsworth, was a gentle and devout woman, and his father, who claimed descent from John Alden, a most sensible and large-spirited man. Thus the refined, wholesome home influences of his childhood and youth gave final impress to a character naturally amiable, sympathetic, and unselfish. At the age of fourteen he entered Bowdoin College, where he so distinguished himself in the study of modern languages that he was sent to Europe to prepare for the professorship which he held in that college from 1829 to 1834. In 1831 he married Miss Mary Potter, of Portland, a gifted and charming woman; and in 1834 published his first important work, *Outre Mer*, a volume of prose sketches. He was elected in 1835 to the chair of modern languages and literature in Harvard University, and after another year spent in Europe in the study of Scandinavian languages and literature, he entered on a professorship which was to last, with interruptions, for seventeen years. Before his return to America, however, he was afflicted by the loss of his wife at Rotterdam, in 1835. For a period of six years he remained at Harvard, living in the old Cragie house, where the prose romance, *Hyperion*, was published (1839), and the *Voices of the Night* (1839), *Poems on Slavery* (1842), and the *Spanish Student*, a drama in three acts (1843), were written. Then, for a third time he went abroad. Returning, he resumed his professorship and retained it until 1854. His remaining years were quiet, contemplative, and uneventful except for the one tragedy which broke their serenity—the death of his second wife, who was burned before his eyes in their Cambridge home.

In 1847 appeared *Evangeline;* in 1855, *The Song of Hiawatha;* and in 1858, *The Courtship of Miles Standish*, all thoroughly American in theme and sentiment. In 1863 was published *Tales of the Wayside Inn;* in 1867, *Flower De Luce*, and in 1868 came *The New England Tragedy*, which with *The Golden Legend* (1852), and *The Divine Tragedy* (1872), forms the trilogy *Christus.* In company with his three daughters, Longfellow made a last trip to Europe in 1868–9. While abroad he received the degrees of LL. D. and D. C. L. from the universities of Cambridge and Oxford, respectively. Eleven years later (1882) death came to him in his own home. *Three Books of Song*, *Aftermath*, *The Hanging of the Crane*, *Morituri Salutamus*, the *Masque of Pandora*, *Keramos*, a *Romance*, and *Ultima Thule* were the chief productions of his later years.

Longfellow's power of graceful translation is seen in *The Poets and Poetry of Europe* (1845), and in the translation of Dante's *Divine Comedy* (1867), but his fame rests chiefly upon his three American epics. Though he possessed wide culture and his poetry is remarkably free from vulgarity, he is preeminently the poet of the common people. The truths he expresses may be commonplace, but they are realized by him with such fresh force, and are so simply and sympathetically told that his power of appeal is unusually great among a large body of people for whom the more abstruse poets have no message. Refined in sentiment, musical in form, stimulating in effect, his verse is one of the most potent influences in American Literature. Pl. 13, Vol. II. GRACE EDITH SELLON.

Long Island, an island belonging to New York, 118 mi. in length, and varying from 12 to 23 mi. in breadth; area 1,682 sq. mi. It is connected with New York City by a great suspension bridge carried across East River, and is separated from Connecticut by Long Island Sound. There are considerable tracts covered with timber; the most fertile portions are carefully cultivated, and much produce is sent to New York and Brooklyn. Railways are numerous. The chief city is Brooklyn, but there are many popular seaside resorts along the coast.

Long Island City, Queens co., N. Y., on East River, n. of Brooklyn, connected by ferry with New York. Railroads: Long Island; N. Y. & Rock Beach; and N. Y. & Mass. Beach. Industries: large oil refineries, sulphuric acid factories, carpet and piano works. Part of Queens Borough, Greater New York.

Long Island Sound, an arm of the sea between Long Island and the state of Connecticut, about 115 mi. long and generally about 20 mi. wide. It is connected with New York Bay by the strait called East River.

Longitude, in geography, the distance of a place due east or west from a meridian taken

as a starting point, this distance being measured along the equator or a parallel of latitude; in other words, it is the angle between the meridian plane of one place and some fixed meridian plane. Longitudes are generally reckoned from the meridian of Greenwich; the meridians of Paris, Ferro, and Washington are or have been also employed. Since the parallels of latitude get smaller toward the poles, at which all the meridians converge, it is evident that degrees of longitude which are 69½ statute mi. long at the equator get shorter toward the poles, at which they finally become 0. As the earth makes one revolution on its axis, that is, turns through 360° of longitude from west to east, in twenty-four hours, if the sun or a star is on the meridian of any place at a particular time it will be on the meridian of another place 15° west of the first in one hour. Thus 15° of longitude represent one hour of difference in time, and hence longitude may be easily determined by the use of the chronometer set to Greenwich time, which is the method commonly employed at sea. Longitude is reckoned to 180° eastward or westward of the fixed meridian. The latitude and longitude of a place are what enables us to fix its exact position on a map or globe. Celestial longitude is quite analogous to terrestrial.

Longstreet, JAMES (1821-1904), a distinguished American soldier, b. in S. Carolina. He graduated at West Point in 1842; saw service on the Mexican frontier; was one of the greatest Confederate generals in the Civil War, taking a prominent part at Williamsburg, Bull Run and Gettysburg. After the war he held important government positions, among them Minister to Turkey and U. S. Commissioner of Railroads, which post he held at the time of his death. He was married twice, the last time in 1897. He died at Gainesville, Ga., Jan. 2, 1904.

Longton, a municipal borough of England, in Staffordshire, 5 mi. s.e. of Stoke-upon-Trent. It is a seat of china and earthenware manufacture, and has breweries, malt kilns, brick works, and in the vicinity collieries and iron mines. Pop. 34,327.

Loo-Choo (LEW-CHEW, LIU-KIU; Japanese, RIU-KIU), a chain of islands in the Pacific, between Japan and Formosa. The largest island is Okinaw, or Great Loo-Choo (area about 500 sq. mi.). Oshima, the island next in size, has an area of 300 sq. mi. The chief products are rice, wheat, maize, and batatas; the sugar cane, cotton, sago, tobacco, indigo, the fig, and the banana are also grown. The inhabitants are mainly of race akin to the Japanese, but their manners and civilization are chiefly those of the Chinese. Since 1874 the archipelago has belonged to the Japanese empire. Pop. 356,801.

Loquat, a Chinese and Japanese fruit cultivated in the sub-tropical countries of Europe and in California and Florida. The tree is an evergreen and has a height of 20 to 30 feet, but when cultivated is not allowed to exceed 12 feet. The fruit is pear-shaped, yellow and about an inch in diameter. The seeds have a fine flavor which they impart to tarts. See colored plate, Fruits—Apple.

Lorain, a city in Lorain co., O., 25 m. w. of Cleveland; on Lake Erie at the mouth of the Black river, and on the N. Y., Chi. & St. L. and the Cleveland, Lorain & Wheeling railroads. It has a fine harbor, is in a natural-gas region and the outlet for the Central Ohio coal fields. It ships large quantities of coal, lumber, iron-ore and grain. Its industries include foundries, automatic shovel works, steel works, ship building, stove works and brick works. It has a public library and owns and operates its water works. Lorain was chartered as a city in 1896. Pop. 1900, 16,028.

Lorca, a town of Southern Spain, in the province and 42 mi. s.w. of Murcia, consists of an old Moorish town on a slope crowned by a castle, and a lower modern town. There are manufactures of coarse woolens, linens, leather, soap, and earthenware, and an important annual fair which lasts fourteen days. In the vicinity are lead mines. Pop. 58,327.

Lorelei (lō're-lī), a precipitous cliff on the Rhine, about 450 ft. high, half a mile above St. Goar. Legend gives it as the abode of a siren, who by her singing enticed boatmen thither to their destruction.

Lor'ikeet, or *Loriquet*, a diminutive of lory, applied with little or no discrimination to any of the smaller species. See *Lory*.

Lorne, RIGHT HON. JOHN GEORGE DOUGLAS SUTHERLAND CAMPBELL, MARQUIS OF (1845–), eldest son of the Duke of Argyll, and educated at Eton, St. Andrew's University, and Cambridge. He represented Argyllshire in the Liberal interest (1868–78), married the Princess Louise in 1871, and was governor general of Canada from 1878 to 1883. He has written several books, tales, etc., among which we may mention *The Book of Psalms*, literally rendered in verse; *A Trip to the Tropics; Guido and Lita, a Tale of the Riviera* (in verse); *Memoirs of Canada and Scotland.*

Lorrain, CLAUDE (1600-82), a French landscape painter and etcher, whose real name was Claude Gelée. After studying in Naples and Rome, he traveled through Germany and France, then returned to Italy and settled in Rome. He enjoyed the patronage of the popes, Urban VIII and Clement IX, and his popularity was so great that he found it difficult to supply the demand for his pictures. Among his famous paintings are the *Embarkation of St. Ursula* in the National Gallery, London, the *Finding of Moses* in the Madrid Gallery, the *Expulsion of Hagar* at Munich, and the *Village Dance*, and the *Landing of Cleopatra at Tarsus* in the Louvre, Paris. His pictures are noted for the brilliant effects of light reflected in the sky, clouds and water and for the poetic feeling shown in the interpretation of nature.

Lorraine (German, *Lothringen;* anc. *Lotharingia*), a territory now divided between Germany and France, was originally so named as being the kingdom of Lothaire II. It was afterward divided into two parts, Upper and Lower Lorraine. At the end of the war be-

tween France and Germany in 1870–71 a considerable portion of Lorraine, including the fortresses of Metz and Thionville, was annexed to Germany, and now forms part of the imperial territory of Alsace-Lorraine (which see).

Lory, a group of scansorial birds, of the family Psittacidæ or parrots, having broad tails and dense soft plumage, the colors of which are brilliant. They are found in the Eastern Archipelago, also in New Guinea, Borneo, and the South Sea Islands. The collared lory is easily taught to speak.

Los Angeles, Los Angeles co., Cal., on Los Angeles River. Surrounding country agricultural. Railroads: Southern Pacific; Southern California or Santa Fé system; Los Angeles terminal; Redondo Beach, Los Angeles & Pacific. Industries: packing company, flouring mills, iron foundries, candy and cracker, can, fertilizer, pipe, brick, bicycle, and other factories. The town was first settled in 1781 by Don Felepe de Neve and became a city in 1850. Pop. 1900, 102,479.

Lot (lō), a department in the south of France; area 2,020 sq. mi. Vines, the mulberry for silkworms, and plums are extensively grown. Sheep rearing is an important industry. Corn and other agricultural products are largely exported. The capital is Cahors. Pop. 553,885.

Lot-et-Garonne (lō-e-gȧ-ron), a department in the s.w. of France; area 2,050 sq. mi. Prunes and chestnuts are largely exported, and the cork oak is abundant. There is an active trade in wine, brandy, meal, hemp, resin, etc. Capital, Agen. Pop. 307,437.

Lot'tery, a scheme for the distribution of prizes by chance, the plan being generally to have a certain number of prizes and a much greater number of tickets, the prizes being allotted according as the drawing of numbered tickets from a suitable receptacle shall decide. In most of the U. S., lotteries, formerly very commonly resorted to as a means of assisting colleges or benevolent institutions, have been abolished. By act of Congress they are deprived the use of the mails.

Lotus, a name applied to a number of different plants, from the lotus famous in Greek legend. One of these is the *Zizyphus Lotus*, a native of Northern Africa and Southern Europe, belonging to the nat. order Rhamnaceæ. It is a shrub 2 or 3 ft. high, bearing a fruit, the jujube, which is a drupe of the size of a wild plum. Some think this was the food of the Lotophagi (see *Lotophagi*), though others consider Homer's lotus to have been the date, or the berry of the *Rhamnus Lotus*, a North African shrub, while others again refer it to the agreeable berry of the *Nitraria tridentata*, still greatly prized by the Berbers. The name lotus was also given to several species of water lily, as the blue water lily, the Egyptian water lily, and to the nelumbo, which grow in stagnant or slowly running waters. *Nymphæa cærulea* and *N. Lotus* are often found figured on Egyptian buildings, columns, etc., and the nelumbo, or Hindu and Chinese lotus, bears a prominent part in the mythology of these countries. The name is also given to a genus of plants, consisting of creeping herbs and undershrubs, chiefly natives of temperate

Lotus.

regions throughout the world. Four or five species are found in Britain, where they are known as bird's-foot trefoil.

Lotze (lot'se), Rudolf Hermann (1817–1881), a German philosopher and physiologist, b. at Bautzen, studied philosophy and medicine at Leipsic; was appointed professor of philosophy at Göttingen in 1844, and was called in 1881 to Berlin, where he d. As a philosopher the standpoint of his system may be described as a teleological idealism, according to which the sufficient ground for all being, and for all that takes place in the universe, is found in the idea of the Good. Among his works are *Metaphysik* (1841), *Universal Pathology* (1842), *Logik* (1843), *On the Idea of Beauty* (1846), *Medical Psychology* (1852), *Microcosmus, Ideas for a History of Nature and Humanity* (1856), *System of Philosophy* (1874–84),

Loubet, Emile (1838——), a French statesman and president of the republic. He began his career as a lawyer and rose rapidly. He was elected to the chamber of deputies in 1876, and to the senate in 1885. In 1887 he became minister of public works, and premier in 1892. In 1896 he was chosen president of the senate, and on the death of President Faure, in 1899, he was elected president of France. Pl. 12, Vol. II.

Louis I (778–840) (or as a German name Ludwig, surnamed *Le Débonnaire*, or *the Pious*), the son of Charlemagne, succeeded his father in 814 as king of the Franks and emperor of the West. In 817 he divided his dominions among his three sons, Lothaire, Pepin, and Louis. In 829, in consequence of the urgent solicitations of his second wife, Judith of Bavaria, who had borne him a son, he made a new division of the empire. The result was that the elder brothers revolted and commenced a war, which, with various fortune to the parties chiefly concerned, lasted till the death of the emperor. He was succeeded as emperor by his son Lothaire I; and by the treaty of Verdun in 843 his son Charles the Bald obtained the territories from which France as a separate nation

ality developed; while another son, Louis the German, obtained territories from which the distinctive German nationality developed.

Louis VII, of France (1120–1180) (counting from the above Louis I), succeeded his father Louis VI in 1137. He joined the second crusade to Palestine in 1147, but returned two years afterward, having suffered many disasters, and lost most of his men. His divorced wife Eleanor married Henry II of England, who thus acquired Guienne and Poitou. He was succeeded by his son Philip Augustus.

Louis IX (St. Louis) (1215–1270), king of France, eldest son of Louis VIII, succeeded to the throne in 1226. In the year 1244 when sick of a dangerous disorder, he made a vow to undertake a crusade to Palestine; and in August, 1248, sailed with his wife, his brothers, and 80,000 men to Cyprus, and in the following year proceeded to Egypt. It was not till the year 1254 that Louis returned to France, and employed himself in improving the condition of the people by wise laws. In 1270 he determined to undertake another crusade. He sailed to Africa, besieged Tunis, and took its citadel. But a contagious disorder broke out, to which he himself, together with a great part of his army, fell a sacrifice. In 1297 he was canonized by Boniface VIII.

Louis XI, king of France (1423–1483), eldest son of Charles VII. On his father's death in 1461, he assumed the crown. After the death of Charles the Bold, of Burgundy, before Nancy in 1477, Louis took possession by force of a considerable part of his dominions as vacant fiefs of France, on account of which a war arose between him and Maximilian of Austria, who had married Mary, the daughter of the deceased duke. It was eventually agreed that the dauphin should marry Margaret, daughter of Maximilian, and receive the counties of Artois and Burgundy. In 1481 Louis, who had been twice affected by apoplexy, haunted by the fear of death, shut himself up in his castle of *Plessis-les-Tours*, and gave himself over to superstitious and ascetic practises. The great object of Louis was the consolidation of France, the establishment of the royal power, and the overthrow of that of the great vassals, and in achieving this end he was very successful, although by most unscrupulous means. He encouraged manufactures and trade, and did much for the good of his kingdom, but was cold-hearted, cruel, and suspicious. Louis XI was the first French monarch who assumed the title of *Most Christian King*, given him by the pope 1469.

Louis XII (1462–1515), king of France from 1498 to 1515, called by his subjects *le Père du Peuple*. He was the son of Charles, duke of Orleans, grandson of Charles V. He divorced his first wife Jeanne, daughter of Louis XI, and married the widow of Charles VIII, thus uniting the Duchy of Brittany with the crown. In Italy he conquered the Duchy of Milan, took possession of Genoa, and fought with Ferdinand the Catholic for the kingdom of Naples. Louis took part in the League of Cambray against the Venetians, whom he defeated at Agnadello in 1509. In 1510, however, he had to face the Holy League formed against him by Julius II, Venice, Spain, England, and the Swiss; was beaten at Novara by the Swiss in 1513, and by the English at Guinegate, and had to retreat out of Italy. He was succeeded by Francis I.

Louis XIII, king of France (1601–1643), surnamed the *Just*, the son of Henry IV. He ascended the throne (1610) after the murder of his father. In 1614 Louis was declared of age, and married the year following Anne, daughter of Philip III of Spain. His mother was now exiled from court, and excited a civil war, during which the Huguenots also rose in arms against the king. Louis gave himself up to the guidance of Cardinal Richelieu. A peace was concluded in 1623, but it was not of long continuance. Eventually Rochelle, the headquarters of the Huguenots, was captured (1628), and the revolt, headed by the queen-mother, was broken by the defeat of the insurgents at Castelnaudary (1632). Louis was now induced by Richelieu to take part in the Thirty Years' War, and obtained frequent successes over the Austrians and Spaniards, adding Roussillon, Alsace, and the Duchy of Bar to France.

Louis XIV, king of France (1638–1715), known as *Louis the Great*, son of Louis XIII and Anne of Austria, was b. at St. Germain-en-Laye and succeeded his father in 1643. His minority was occupied by the continuation of the wars against Austria; by the victories of Condé—victories crowned by the Treaty of Westphalia; by the struggles of the parliament against the regent and Mazarin; by the bloody troubles of the Fonde faction; the revolt of Condé, etc. In 1659 peace was concluded with Spain, and Louis married Maria Theresa, daughter of Philip IV of Spain. On the death of Mazarin in 1661 Louis resolved to rule without a minister. He reformed the administration and the taxes, and made the famous Colbert superintendent, who accomplished a series of financial reforms, created the Company of the Indies, made roads, canals, and founded manufactures. In 1662 he purchased Dunkirk for 5,000,000 livres from the needy Charles II. On the death of his father-in-law he claimed Franche-Comté and Flanders, and invaded those territories, Turenne and Condé leading his armies, in 1667. In 1672 he declared war with Holland, and in a few weeks he had conquered three provinces; but the formation of the Grande Alliance between the emperor, William of Orange, Spain, Denmark, etc., checked his ambition. Still the Treaty of Nimeguen (1678) left Louis in possession of Franche-Comté and a part of Flanders. Louis was now at the height of his glory, and the splendor of his court, adorned by whole groups of great generals, poets, philosophers, and notable men, far outshone that of other European courts. Maria Theresa having died in 1683, he secretly married Madame de Maintenon about 1684 or 1685. She is said to have had a considerable part in the revocation of the Edict of Nantes, which drove so many industrious Protestants into exile. The League

of Augsburg was now formed against Louis by Spain, Holland, England, Sweden, etc. A general war continued with frequent and severe losses to the French till the Peace of Ryswick (1697), by which Louis was to restore all his recent conquests and most of the acquisitions made since the Peace of Nimeguen. The question of the Spanish Succession once more brought Louis into conflict with a united Europe. The principal episodes of the war were the victories of Blenheim, Ramillies, and Malplaquet, gained by Marlborough and Prince Eugène. Hostilities were terminated by the Peace of Utrecht in 1713, without altering the relative position of the combatants. He was succeeded by his great-grandson Louis XV. The brilliant reign of Louis left France impoverished and most of her industries languishing.

Louis XV (1710–1774), the great-grandson of Louis XIV, commenced his reign in 1715, but did not actually assume the government himself till 1723. In the interval the country was under the regency of the duke of Orleans, by whose folly, and by the rash financial schemes of John Law (see *Law*), it was brought to the verge of ruin. In 1726 Louis placed his tutor, Cardinal Fleury, at the head of the administration. In 1725 he had married Maria, daughter of Stanislaus Leczynski, the dethroned king of Poland, and in 1733 became involved in a war in support of his father-in-law's claims. After two campaigns he acquired for Stanislaus the duchy of Lorraine. After the death of Charles VI, in 1740, the War of the Austrian Succession broke out, in which the victories of Count Maurice of Saxony gave new splendor to the French arms; and by the peace of Aix-la-Chapelle, in 1748, France regained her lost colonies. Through the influence of Madame de Pompadour and her favorite, Choiseul, in 1762 the Jesuits were declared a society hostile to the State and in 1764 by royal edict the Order was suppressed throughout the French dominions. (See *Jesuits.*) From 1769 he was governed by Madame du Barry, who is said to have cost the royal treasury in five years 180,000,000 livres. The Seven Years' War (1756-63), in which France was involved, brought severe losses and humiliations on the country. In 1771 a quarrel between the new prime minister, the Duke d'Aiguillon, and the parliament induced the king to banish the members of the parliament from Paris. Louis died of smallpox, leaving a debt of $800,000,000 and a demoralized kingdom.

Louis XVI (1754–1793), king of France, grandson of Louis XV. In 1770 married Marie Antoinette of Austria. He ascended the throne in 1774. He could not comprehend the situation of affairs indeed, and had no thought of checking his personal extravagance; while the queen also gave herself up to her love of gaiety, and the festivals of Versailles and Petit Trianon were on a scale of lavish magnificence. At last, in 1789, all the grievances and discontents which had been gathering during a long period of misrule found vent, the populace attacked and destroyed the Bastile; and the revolution was accomplished. In June, 1791, the position of the king had become so perilous that he attempted to escape, but was intercepted at Varennes and forced to return. Among the events which followed were the attack of the populace of Paris on the royal palace, June 20, 1792; the king's arrest in the National Assembly, to which he had fled for refuge; finally, his trial before the convention, where he replied to the charges with dignity and presence of mind. On Jan. 16, 1793, he was declared guilty of a conspiracy against the freedom of the nation by a vote of 690 out of 719; on the 17th he was condemned to death, by a majority of only five in 721, and on the 21st he was guillotined.

Louis XVII, king of France (1785–1795), second son of Louis XVI. On the death of his elder brother in 1789 he became dauphin, was proclaimed king by the royalists on the death of Louis XVI, was soon after separated from his mother, sister, and aunt, and delivered (1793) to a shoemaker named Simon, a fierce Jacobin, who, with his wife, treated the young Capet with the most unfeeling barbarity. He survived this treatment only till June 8, 1795, when he d. at the age of ten years and two months.

Louis XVIII, king of France (1755–1824), third son of the dauphin, the son of Louis XV. At the accession of his brother Louis XVI in 1774 he received the title of Monsieur. After the death of Louis XVI Monsieur proclaimed his nephew King of France as Louis XVII, and in 1795 he was himself proclaimed by the emigrants King of France and Navarre. For many years he led a wandering life, supported by foreign courts and by some friends of the house of Bourbon. He at last took refuge in England in 1807, and lived there till the fall of Napoleon opened the way for him to the French throne. He entered Paris in May, 1814; had to fly on Napoleon's escape from Elba, but was replaced on the throne by the Allies after Waterloo. He was weak in character, but gained considerable esteem and affection.

Louisburg, a seaport of Cape Breton, province of Nova Scotia, Canada, on the s.e. side of the island. It was strongly fortified under the French; but was taken by the British in 1763, who demolished the fortifications, after which the town fell into ruin. It has a fine harbor with a light-house on the east head; is a port of call for steamers, but the inhabitants consist of only a number of fishermen.

Louisiana (loo′e-ze-ä′na), the *Creole State*, a Gulf state, is bounded on the n. by Arkansas, on the e. by Mississippi and the Gulf of Mexico, on the s. by the Gulf, and on the w. by Texas. The extreme length from n. to s. is 280 m.; extreme breadth from e. to w. 290 m.; gross area, 48,720 sq. m. Pop 1900, 1,381,625, of which 652,013 were colored.

Surface.—Louisiana's soils are divided into alluvial lands, sea or coast marsh, bluff land, prairies, and long leaf pine lands, hill lands and oak lands. The state has the greatest body of alluvial lands existing anywhere in the world. These are nearly all protected by

magnificent levees, maintained by the state and national governments. No other state in the Union has so many miles of navigable rivers, bayous and lakes. The Mississippi and the Red rivers are the chief drainage channels and almost all of the larger streams of these basins diverge from them. Bayou Macon, Onachita river, the Sabine and Pearl rivers are important waters. The highest land is about 500 feet above the sea level.

Climate.—Louisiana's climate is admirable—breezy and cool in summer, mild in winter, and healthful at all times. In summer, the thermometer rarely reaches 95°, and in winter the average temperature is 49°. Epidemics occur but seldom and now that the yellow fever, which was formerly dreaded, is so thoroughly understood, the disease is no longer feared. The average annual rainfall at New Orleans is 70 in., decreasing in quantity as one goes northward, with 45 in. as an average in the extreme north.

Mining.—The mineral products are comparatively unimportant, or as in the case of petroleum and copper, of insufficient quantity. There are vast deposits of sulphur, rich marble quarries and many salt springs, but these resources are as yet quite undeveloped. Quartz crystals, jasper, agates, cornelians, onyx, sardonyx and feldspar abound in the tertiary strata.

Agriculture.—The state may, for agricultural purposes, be considered in two divisions, North Louisiana, the portion north of the mouth of the Red river; and South Louisiana, the portion south of this river. Cotton is the chief crop of the former and sugar-cane of the latter. Other products are rice, tobacco, corn, potatoes, forage crops, garden truck, oranges, lemons, figs, bananas, mandarins, olives, blackberries, dewberries, strawberries and grapes. Sugar culture is the most important industry of the state. The production in 1899 was $27,004,812. The output of rice in 1900 was 172,732,430 pounds. The raising of live stock is also an important industry. The forests of Louisiana are still extensive.

Manufactures.—The manufacturing interests have greatly increased since 1850. The manufactures depend closely upon its natural resources. The refining of sugar is the most important industry, the product in 1900 being valued at $47,891,691. Other manufactures are paper, cotton seed oil and cake, and coarse cloth bags. The cleaning and polishing of rice is an important industry. But second in importance is the manufacture of lumber and timber products, which in 1900 were valued at $17,408,513. The valuable cypress forests are still practically untouched, and long-leaf pine continues to cover a wide area. The fish and oyster industry is one which only awaits development to become a source of great wealth.

Transportation.—The leading railway systems are the Illinois Central, the Southern Pacific, the Louisville & Nashville, the New Orleans & Northeastern and the Vicksburg, Shreveport & Pacific. The mileage is over 3,000, and a number of new roads have been projected and are now being constructed. The rivers, bayous and lakes are almost all navigable. They furnish excellent transportation facilities and create competition in rates. New Orleans is the natural outlet of the greatest agricultural valley of the world, with a larger cotton market than that of any other city except Liverpool. The coastwise and foreign trade together approximate $450,000,000 annually. The exports for 1900 were valued at $118,858,764; the imports at $17,490,811.

Education.—Interest in education is steadily increasing in Louisiana. In 1899, the total revenue for schools was $1,242,026. Every parish (county) is well provided with public schools for both white and colored pupils. There are excellent public high schools in New Orleans, New Iberia, Lake Charles and Shreveport. Institutions for higher learning are the University of Louisiana and an agricultural college at Baton Rouge, a state normal school at Natchitochees, and Tulane University and the Southern University (colored) at New Orleans. The industrial school at Ruston is a magnificently equipped institution. There are numerous charitable institutions, the most remarkable of which is the Charity Hospital in New Orleans, founded in 1786 by Don Andre Almonaster y Rosas, and receiving an annual appropriation from the state of $80,000.

History.—Louisiana was first visited by Europeans about 1519, when Alvarez de Pineda and his companions entered the mouth of the Mississippi and spent six weeks on its banks. In 1541, De Soto, the Spanish adventurer, explored the coast west of Florida to the Mississippi river and visited the country on both sides of the river, where New Orleans now stands. In 1682, La Salle descended to the mouth of the river, took possession of the country and named it Louisiana in honor of his king, Louis XIV of France. The first permanent settlement was made in 1699 by d'Iberville, at Biloxi. In 1718, the charter of the Western Company was registered in the Parliament of Paris and the commerce of Louisiana was granted to it for twenty-five years. In the same year, Bienville, the governor of the colony, founded New Orleans. In 1722, the city was made the seat of government. In 1731, France declared Louisiana a royal province, and in 1763, by secret treaty, ceded to Spain all that portion which lay west of the Mississippi, together with the city of New Orleans and the island on which it stands; and on the same day ceded to Great Britain all the rest of her territory in America. In 1800, Napoleon restored Louisiana to France, and in 1803, sold the province to the United States for $15,000,000. Louisiana was admitted to the Union in 1812. In the War of 1812, New Orleans was attacked by the English and bravely defended by about 5,000 men under Gen. Jackson. The progress of the state from the close of this war until the Civil War was rapid. Louisiana passed the ordinance of secession Dec. 23, 1860, and in 1861 adopted the Confederate Constitution. Some of the earliest as well as the latest scenes of the war were en-

acted in the state. During the period of reconstruction, New Orleans was the scene of long-continued excitement. In 1868, Louisiana ratified the fourteenth amendment. In 1877, a new constitution was adopted. In the same year, James B. Eads completed his jetties in the South Pass of the Mississippi. In 1884, occurred the New Orleans Exposition, which had valuable commercial results. The principal cities of Louisiana, with population in 1900, are: Baton Rouge, the capital, 11,269; New Orleans, 287,104; and Shreveport, 16,013.

Louisiana Purchase, see *Purchase, Louisiana.*

Louisville, county seat of Jefferson county, Kentucky, on the Ohio river, opposite New Albany and Jeffersonville, 110 miles southwest of Cincinnati. Railroads: Louisville & Nashville; the Southern; Illinois Central; Louisville, Henderson & St. Louis; Louisville, Evansville & St. Louis; the Pennsylvania; the Big Four; Chesapeake & Ohio; Monon Route and Baltimore & Ohio Southwestern. A great addition to the shipping facilities of Louisville is the recent widening of the mouth of the canal. This gives the city the best harbor on the Ohio river. Industries: Louisville is the largest leaf-tobacco market in the world; its trade in wheat, lumber and timber products, fine whiskies and iron products is very large. This city has the largest plow factory in the country, extensive sole-leather tanneries, wagon plants, box and wooden-ware factories and car shops. One very large cotton mill is in operation, while several great mills making Kentucky jeans constitute the largest textile industry west of Philadelphia. Manufacturers ship out of Louisville to European ports via Gulf ports as well as the eastern seaboard. Louisville has fine public schools, a manual training school, excellent private schools, several medical colleges, the University of Louisville and two theological seminaries. The library of the Polytechnic Society contains 50,000 volumes and is open to the public. Louisville is connected with Jeffersonville by two iron bridges, and with New Albany by a handsome cantilever bridge The city has a fine system of boulevards and several beautiful parks. Pop. 1900, 204,731.

Louisiana, Pike co., Mo., on the Mississippi River. Railroads: Chicago & Alton; C. B. & Q.; and St. L. K. & N. W. Industries; tobacco factories, lumber mills, foundries, wagon and machine shops. It ships large quantities of wheat, pork and tobacco. Pop., 1900, 5,131.

Louis Philippe (1773-1850), king of the French. He was the eldest son of Duke Louis Philippe Joseph of Orleans, surnamed Egalité, and during his father's lifetime he was known as Duke of Chartres. He entered the army in 1791, and favoring the popular cause in the revolution he took part in the battles of Balmy and Jemappes; was present at the bombardment of Venloo and Maestricht, and distinguished himself at Neerwinden. Dumouriez had formed a scheme for placing him on the throne as a constitutional monarch, and being included in the order of arrest directed against Dumouriez, in 1793, he took refuge within the Austrian territory. For twenty-one years he remained exiled from France, living in various European countries, and in America. He had become Duke of Orleans on the death of his father in 1793, and in 1809 he married the daughter of Fedinand IV of Naples. After the fall of Napoleon I he returned to France, and was reinstated in his rank and property. At the revolution of July, 1830, he was made "lieutenant general of the kingdom," and in August became king of the French. He reigned for eighteen years, when the revolution of 1848 drove him from the throne to England where he remained till his death.

Louis-Quatorze Style (lö-ē-kà-torz), the name given to a style of architecture and internal ornamentation prevalent in France in the reign of Louis XIV. The palace of Versailles and the east front of the Louvre are prominent examples of the style. The name of *Louis-Quinze* (lo-e-kanz) is given to the variety of this style which prevailed in France during the reign of Louis XV.

Louse, the common name of a genus of apterous insects, parasitic on man and other animals. The common louse is furnished with a simple eye or ocellus, on each side of a distinctly differentiated head, the under surface of which bears a suctorial mouth. There is little distinction between the thorax and abdomen, but the segments of the former carry three pairs of legs. The legs are short, with short claws or with two opposing hooks, affording a very firm hold. The body is flattened and nearly transparent, composed of 11 or 12 distinct segments. The young pass through no metamorphosis, and their multiplication is extremely rapid. Most, if not all, mammals are infested by lice, each having generally its own peculiar species, and sometimes having two or three. Three species are said to belong to man, viz., *P. vestimenti* (body-louse), *P. capitis* (head-louse), and *P. pubis* (crab louse).

Head Louse, magnified.

Louvre, the old royal palace at Paris, said to have been a royal residence in the reign of Dagobert, 628. Francis I erected that part of the palace which is now called the *old Louvre*, and the buildings have been enlarged and adorned by successive kings, particularly Louis XIV. The *new Louvre* begun by Napoleon I was completed by Napoleon III in 1857. The whole group of buildings is distinguished by its great extent, and by its elegant and sumptuous architecture. It contains museums of paintings, drawings, engravings, bronze antiques, sculptures, ancient and modern, together with special collections of antiquities, and an ethnographical collection. It was much injured by the Communists in May, 1871, the Richelieu pavilion, containing the imperial library of 90,000 volumes and many precious MSS., having been entirely destroyed.

Lov'age, an herbaceous perennial plant, widely distributed throughout temperate regions. Common lovage is sometimes used as

an aromatic stimulant. *L. scoticum*, found on the sea coasts of Scotland, is occasionally used as a pot herb.

Lovebird, a name given to a genus of birds of the parrot family. They are a beautiful group, consisting of very diminutive species, found in America, Africa, and Australia. They receive their name from the great attachment shown to each other by the male and female birds. Swindern's lovebird is barely 6 in. in length.

Lovelace, RICHARD (1618–1658), a poet and dramatic writer, son of Sir William Lovelace of Norwich, where he was b.; he was distinguished by his fidelity to Charles I, in whose interest he expended his whole fortune, and died in poverty. His poems were light and elegant amatory pieces. He wrote two plays, the *Scholar*, a comedy, and the *Soldier*, a tragedy.

Lover, SAMUEL (1797–1868), novelist, poet, and musical composer, was b. in Dublin. He first devoted his attention to painting, but afterward turned to literature, and wrote novels, which he illustrated with his own pencil, dramas, operettas, and songs, which he set to music. Among his works are *Legends and Stories of Ireland* (1832–34); *Rory O'More*, a novel (1837); *Songs and Ballads* (1839); and later the novels *Handy Andy* and *Treasure Trove. The Angel's Whisper*, and *The Low-backed Car* are among his most popular songs.

Low, SETH, educator, was b. in Brooklyn, N. Y., in 1850. He graduated at Columbia College in 1870 and entered business. He was mayor of Brooklyn from 1881 to 1885. He was elected president of Columbia College in 1889. In 1899 he was one of the U. S. representatives at the peace conference at The Hague. Elected mayor of New York, Nov., 1901.

Lowell, Middlesex co., Mass., on Merrimac River, which here falls 33 ft., giving immense water power. It is 25 mi. n.w. of Boston. Railroads: Boston & Maine, and Old Colony. It is the largest producer of cotton goods in the U. S., having nine extensive corporations, the largest having a capital of $2,500,000. There are also large machine shops and foundries, several carpet and woolen mills and bunting factories. Pop. 1900; 94,969.

Lowell, JAMES RUSSELL (1819–1891), American author, orator and statesman, was born at Elmwood, Cambridge, on the 22nd of February, 1819. The poet's ancestors were among the earliest and most eminent settlers of New England. Lowell's early education was obtained in William Wells' School at Cambridge. In his sixteenth year he entered Harvard University, where he graduated in 1838. He studied law three years, and after admission to the bar opened an office in Boston. But the pursuit of the law was uncongenial to Lowell and he soon returned to Elmwood to devote himself to literature. As a college student he had written verse, and at graduation wrote the *Class Poem*. As a law graduate he issued a book of verse, *A Year's Life*. But his first venture in literature as a profession was a monthly magazine, *The Pioneer*. After running three months, this venture ended disastrously, owing to the failure of the publishers. In 1855, he was appointed to succeed Longfellow as Professor of Modern Languages and belles-lettres at Harvard, and spent two years abroad in special study with reference to the duties of that position. The *Atlantic Monthly* was founded in 1857 with Lowell as its chief editor. From 1863 to 1872, he was associated with Charles Eliot Norton in the management of the *North American Review*. Meanwhile his writings had brought him before the public as an independent supporter of the principal measures of the Republican party, and in 1876, he was one of their presidential electors. In 1877, he was appointed by President Hayes to the Spanish mission, and in 1880, was transferred to England, where he remained until 1885 and did much toward bringing the American and British peoples together. Lowell died in 1891 in the old family mansion, Elmwood, Cambridge, where he was born and had lived most of his life. Lowell has been called the American representative man of letters. No other of our literary men was great in so many ways. As poet, essayist, critic, orator, scholar and diplomat, he ranked high. Personally, he was a man of strong intellect, wide sympathies and sterling integrity. His poetical works fall into two clearly marked groups. The first begins with his class poem of 1838, and ends with the *Fable for Critics*, 1848; the second begins with the second series of the *Biglow Papers*, 1867, and ends with a little volume of poems published after his death. The chief poem of his earlier period, and one of his most important works, is *The Vision of Sir Launfal*, 1845. Lowell's most entirely original work is the *Biglow Papers*, a series of Yankee dialect poems. The first series, 1848, is a political satire on the United States at the time of the Mexican War; the second, 1867, a satirical protest against the quasi neutrality of Great Britain during our Civil War. Other important works of Lowell are: *A Legend of Brittany*, 1844; *Conversations on Some of the Old Poets*, 1845; *Fireside Travels*, 1864; *Under the Willows* and *The Cathedral*, 1869; *Among My Books*, 1870; *My Study Windows*, 1871; *Democracy and Other Addresses*, 1886; *Political Essays*, 1888; *Heartsease and Rue*, 1888; *Latest Literary Essays*, 1891; *Old English Dramatists*. 1892. Plate 23, Vol III.

Loyalty Islands, a group of Islands in the Pacific Ocean, immediately e. of Caledonia. Pop. about 14,000.

Loyo'la, IGNATIUS (1491–1556) (original name, Inigo Lopez de Recalde), the founder of the order of the Jesuits, was b. at the castle of Loyola, Guipuscoa. When still a young man he entered the army, and during the defense of Pampeluna in 1521 against the French he was severely wounded, and a long and tedious confinement was the result. The only books he found to relieve its tedium were books of devotion and the lives of saints. This course of reading induced a fit of mystical devotion in

which he renounced the world, made a formal visit to the shrine of the Virgin at Montserrat, and vowed himself her knight (1522). After his dedication he made a pilgrimage to Rome and Jerusalem, and from 1524 to 1527 attended the schools and universities of Barcelona, Alcala, and Salamanca. In 1528 he went to Paris, where he went through a seven years' course of general and theological training. Here in 1534 he formed the first nucleus of the society which afterward became so famous, Francois Xavier, professor of philosophy, Lainez, and others having in conjunction with Loyola bound themselves together to devote themselves to the care of the church and the conversion of infidels. Rome ultimately became their headquarters, when Loyola submitted the plans of his new order to Paul III, who, under certain limitations, confirmed it in 1540. Loyola continued to reside in Rome and govern the society he had constituted till his death. He was beatified in 1607 by Paul V, and canonized in 1622 by Gregory XV.

Lübeck (lü'bek), one of the free towns of Germany, and a constituent of the German empire, stands on a low ridge at the confluence of the Wackenitz with the Trave, 38 mi. n.e. of Hamburg, and 12 mi. from the Gulf of Lübeck, a bay of the Baltic. The manufactures are comparatively unimportant, but the trade is extensive, especially with Hamburg, the Baltic ports, and the interior of Germany. Lübeck possesses a territory of 116 sq. mi., and includes the port of Travemünde, and several isolated portions of Holstein and Lauenburg. It has a senate of 14 members and a council of burgesses of 120 members. It became an imperial free city in 1226, and about thirty years later it became the head of the Hanseatic League. Pop. of town 55,399; territory 67,658.

Lublin, a town of Russian Poland, capital of the government of Lublin, 60 mi. s.e. of Warsaw. It has manufactures of cloth, candles, soap, etc., and a large trade. Pop. 38,816. The government has an area of 6,499 sq. mi.; pop. 931,597.

Lucania, an ancient division of Southern Italy, which extended across from the Tyrrhenian Sea to the Gulf of Tarentum.

Lucca, a town of Italy, capital of a province of same name. The manufactures consist chiefly of silk goods, woolen cloth, and Oriental fezes. Pop. 20,421.

Lucerne (Luzern) (lö-sern', lö'tsern), a city of Switzerland, capital of a canton of the same name, beautifully situated on the margin of Lake Lucerne. The "Lion of Lucerne," a monument by Thorwaldsen to the Swiss guards who fell in Paris in 1792 while defending the Tuileries, and the glacier garden, containing relics of the ice period, are objects of interest. Lucerne is one of the three seats of the Swiss Diet, has an important grain market and manufactures of silk and cotton fabrics, and of carriages. Pop. 26,819.

Lucerne, Lake of (Vierwaldstädter-See, or 'Lake of the Four Forest Cantons), a Swiss lake bounded by the cantons of Uri, Schwyz, Unterwalden, and Lucerne, and noted for its magnificent scenery and historical associations. It is nearly cruciform in shape, the bays of Lucerne, Küssnacht, and Alpnach forming the head and arms, while the foot is formed by the bay of Buochs and lake of Uri. Length from Lucerne to Flüelen 27 mi., from Alpnach to Küssnacht at the extremities of the arms about 14 mi.; width from 1 to 3 mi.; greatest depth 510 ft.

Lucerne. See *Alfalfa.*

Lucia, St., one of the British West India Islands. The chief exports are sugar, rum, and cocoa. Castries, the capital, has 3,500 inhabitants. Pop. 45,000, of whom about 900 are white.

Lu'cian, a Greek satirist and humorist, who was b. at Samosata, on the banks of the Euphrates, and lived between A. D. 120 and 200. Little is known of his life, but he is said to have made money as a rhetorician or a lawyer, to have spent much time in traveling, and to have lived for long intervals in Athens. His works are of a witty and satirical character, the most popular being those known as the *Dialogues,* in which he ridicules the popular mythology and the philosophical sects, particularly his *Dialogues of the Gods and of the Dead.*

Lucifer (or in Greek, *Phōsphoros,* both meaning *light-bearer*), a name anciently given to the planet Venus as the morning star. The term is used figuratively by Isaiah (14:12) and applied to the Babylonian king, but it was mistaken by the commentators for a reference to Satan.

Lucil'ius, Caius Ennius (B.C. 148–103), a Roman knight, grand-uncle to Pompey the Great. He is considered the inventor of Roman satire, because he first gave it the form under which this kind of poetry was carried to perfection by Horace, Juvenal, and Persius. Of thirty satires which he wrote, only some fragments have been preserved.

Lucknow' (more correctly Lakhnau), a city of Hindustan, capital of Oude, 610 mi. w. n.w. of Calcutta. It ranks fourth in size among British Indian cities, being next after Calcutta, Madras, and Bombay. Lucknow was one of the chief scenes of the Sepoy mutiny. At the beginning of the mutiny the Residency was fortified by Sir Henry Lawrence, and after his death (July 4, 1857) it was closely besieged by the rebels till relief was brought by Havelock and Outram. The relieving force was only a small one, however, and the British were again besieged, partly in the Residency, partly in a walled garden called the Alambágh. In the middle of October Sir Colin Campbell gained possession of the place after severe fighting; but as it seemed impossible to hold it with the troops at his disposal he left Sir James Outram to defend the Alambágh, and removed the civilians, women, and children to Cawnpore. At last, in March, 1858, Sir Colin returned with a sufficient force, completely defeated the rebels, and permanently recovered the town. Pop. 272,590.

Lucre'tia, in Roman legendary history a lady of distinguished virtue who was outraged by Sextus, son of Tarquinius Superbus, king of Rome. She stabbed herself, and her death

was the signal for a revolution, by which the Tarquins were expelled from Rome and a republic formed.

Lucre'tius, CARUS TITUS (B. C. 98–55), Roman philosophic poet. He is said to have died by his own hand, but about his life almost nothing is known. He is admitted to be one of the greatest of Roman poets for descriptive beauty and elevated sentiment. We possess of his composition a didactic poem, in six books, *De Rerum Natura* (*On the Nature of Things*), in which he exhibits the cosmical principles of the Epicurean philosophy.

Lucullus, LUCIUS LICINIUS (B. C. 115–56), a distinguished Roman naval and military commander. He distinguished himself greatly in his various victorious campaigns against Mithridates, king of Pontus, from the time of Sulla to B. C. 66, when he was supplanted by Pompey. He thenceforward lived in luxurious retirement on the coast of Campania. His house was enriched with a valuable library and works of art, which were freely opened to the curious and learned, among whom was his friend Cicero.

Luddites, a name given to rioters in 1811–16 in Yorkshire, Lancashire, and Nottingham, who attributed the prevailing distress to the introduction of machinery. During these years the above counties were in a perpetual state of disturbance, and much damage to machinery was done by the rioters. They took their name from Ned Ludd, a half-witted lad, who made himself notorious by destroying stocking frames. After the peace, with the return of prosperity, the riots ceased.

Ludhiana (lụd-hi-ä'na), a town of India, province of Punjab, Sutlej; a great central grain mart. Pop. 44,163.

Ludington, Mason co., Mich., on Lake Michigan. Railroad, Flint & Pere Marquette. Industries: salt and iron works, extensive saw and shingle mills. It has a fine harbor. Pop. 1900, 7,166.

Ludlow, GENERAL WILLIAM (1843–1901), an American soldier; b. Islip, L. I., Nov. 27, 1843; educated at West Point Military Academy. He served in the Georgia campaign in 1864, and in the Black Hills and Yellowstone expedition, 1872–1875. He took an active part in the Spanish-American War, commanded the right wing at Santiago, and was made military governor of Havana. In December, 1899, he was ordered to the Philippines, but was obliged to return on account of ill health. He died Aug. 30, 1901. He is author of *Exploration of the Black Hills and Yellowstone Country*, and numerous reports.

Ludwigshafen (lụd'vi*h*s-hä-vn), a town of Rhenish Bavaria, on the left bank of the Rhine, opposite Mannheim. It was founded in 1843 by Louis I of Bavaria, and has become a flourishing town with numerous chemical and other works. Pop. 33,216.

Luke, ST., the evangelist, author of the Gospel which bears his name and of the Acts of the Apostles. He was probably b. at Antioch in Syria: was taught the science of medicine, but the tradition that he was also a painter is doubtful. The date of his conversion is uncertain; he is supposed to have been one of the seventy disciples, and is also one of the two who journeyed to Emmaus with the risen Saviour. He was for several years a companion of the apostle Paul in his travels, so that in the Acts of the Apostles he relates what he himself had seen and participated in.

Lumbago (from *lumbus*, the loin), rheumatism or rheumatic pains affecting the lumbar region, and often disabling a person.

Luminiferous Ether, a hypothetical medium of extreme tenuity and elasticity, supposed to be diffused throughout all space, as well as among the molecules of which solid bodies are composed, and to be the medium of the transmission of light, heat, and other forms of energy. From the extreme facility with which bodies move about in this medium it might be called a fluid; but the undulations which it serves to propagate are not such as can be propagated by fluids. Its elastic properties are rather those of a solid; and its waves are analogous to the pulses which travel along the wires of a piano rather than to the waves of extension and compression by which sound is propagated through air.

Lump Fish (or Sucker), an acanthopterygious fish, so named from the clumsiness of its form. The back is arched and sharp, the belly flat, the body covered with numerous bony tubercles, the ventral fins modified into a sucker, by means of which it adheres with great force to any substance to which it applies itself. Before the spawning season it is of a brilliant crimson color, mingled with orange, purple, and blue, but afterward changes to a dull blue or lead color. It sometimes weighs 7 pounds, and its flesh is very fine at some seasons, though insipid at others.

Luna, the Latin name for the moon, among the Greeks *Selēnē*. Her worship is said to have been introduced among the Romans in the time of Romulus.

Lunacy, in law. "A lunatic," says Blackstone, "is one that hath had understanding, but by disease, grief, or other accident, hath lost the use of his reason." In the U. S. the legislature exercises a protective authority over idiots and lunatics. The statutes of the different states provide that such persons may be put under guardianship; and if a competent judicature have found the fact of lunacy in the prescribed mode, and have appointed a guardian, the fact of lunacy is held to be conclusively proved. Until the contrary be shown, every man is presumed to be of sound mind. In criminal cases lunatics are not chargeable for their own acts, if committed when laboring under defect of understanding. By the common law, if a man in his sound memory commits a capital offense, and before arraignment for it becomes mad, he ought not to be arraigned for it, because he is not able to plead with that caution that he ought. But in general, partial unsoundness will form no defense.

Lunar Caustic, nitrate of silver.

Lunar Theory, the mathematical treatment of perturbations in the moon's motion due

to the attraction of the sun, the earth, and the planets.

Lunatic Asylums, houses established for the treatment of insane persons. Some are established by law, others by the endowments of charitable donors, while others are private establishments. Lunatic asylums, whether public or private, are now under the control of officers appointed under special statutes, and lunatics must be visited at least once a year by medical and legal visitors. The general conduct of lunatic asylums is now brought more into harmony with humanity and common sense. Violence and undue coercion have been generally abandoned.

Lungs, the sole breathing organs of reptiles, birds, mammals, and in part of amphibians (frogs, newts, etc.), the latter forms breathing in early life by branchiæ or gills, and afterward partly or entirely by lungs. In the Mammalia, including man, the lungs are confined to and freely suspended in the cavity of the thorax or chest, which is completely separated from the abdominal cavity by the muscular diaphragm, or "midriff." In man the lungs are made up of honeycomb-like cells which receive their supply of air through the bronchial tubes. If a bronchial tube is traced, it is found to lead into a passage which divides and subdivides, leading off into air cells. The walls of these air-cells consist of thin, elastic, connective tissue, through which run small blood-vessels in connection with the pulmonary artery and veins. By this arrangement the blood is brought into contact with, and becomes purified by means of the air. See *Anatomy.*

Lungwort, a common garden flower, having red and purple tubular blossoms, and leaves speckled like diseased lungs, hence an old-fashioned remedy in pulmonary diseases. A kind of hawkweed and a lichen receive the same name.

Luperca'lia, a Roman festival celebrated annually in honor of Lupercus, an ancient pastoral god, afterward identified with the Arcadian Pan. It was celebrated on February 15 at the Lupercal, a grotto in the Palatine Hill at Rome. Goats were sacrificed, and two youths were arrayed in the skins. With thongs in their hands they ran through the streets of the city striking all persons they met.

Lupine, a very extensive genus of hardy annual, perennial, and half-shrubby plants, some of which are cultivated in gardens for the sake of their gaily-colored flowers.

Lu'pulin, the fine yellow powder of hops, which contains the bitter principle. It consists of little round glands, which are found upon the stipules and fruit, and is obtained by drying, heating, and then sifting the hops. It is largely used in medicine.

Lupus, in medicine, a slow non-contagious tubercular affection, occurring especially about the face, and commonly ending in ragged ulcerations of the nose, cheeks, forehead, eyelids, and lips.

Lurcher, a dog that lies in wait for game, as hares, rabbits, partridges, etc., drives them into nets, runs them down, or seizes them. This species of dog is said to be descended from the shepherd's dog and the greyhound, and is more used by poachers than sportsmen.

Lustration, purification; in particular the solemn purification or consecration of the Roman people, by means of an expiatory sacrifice. As this lustration took place at the end of every five years, *lustrum* came to signify a period of five years.

Lute, a stringed musical instrument of the guitar kind, formerly very popular in Europe. It consists of four parts, viz., the table or belly with a large round hole in the middle; the body, ribbed like a melon, having nine or ten ribs or divisions; the neck, which has nine or ten stops or frets which divide the strings into semitones; and the head or cross, in which are fitted the pegs or screws for tuning the strings, of which there are five or six pairs, each pair tuned in octaves or unisons. The strings are struck by the fingers of the right hand and stopped on the frets by those of the left.

Luther, MARTIN (1483-1546), a German reformer born at Eisleben, Saxony. He was of poor parentage, his father being a miner. When but twenty years of age he graduated as master of philosophy at Erfurt in Thuringia. In 1505 he entered the monastery of the Augustinians at Erfurt and in 1507 was consecrated priest. In 1508 by the influence of his patron Staupitz, who was district vicar of the Order, he was made professor of philosophy in the new University of Wittenberg. At first he lectured upon the philosophy of Aristotle, but soon turned his attention to the Bible. His lectures on this subject attracted so much attention that Staupitz prevailed upon him to preach regularly in the monastery church at Wittenberg. In 1512, upon his return from a visit to Rome in the interests of his Order, he was made doctor of theology and began his famous lectures on Paul's *Epistles.* His first original work, the *Exposition of the Seven Penitential Psalms,* was published in 1517. Meanwhile he had been made district-vicar of the Augustinian Order and now preached not only in the convent chapel but also in the parish church. During these years he had worked zealously for the church and in the interests of his Order. But in 1517 a certain Dominican priest, Johann Tetzel, appeared in the vicinity of Wittenberg selling indulgences, the proceeds of which were to go toward the building of St. Peter's. Just at this time the dedication of the Schloss-kirche was being celebrated at Wittenberg. It was customary upon such days to nail upon the church doors bulletins of general interest to the parish. On the evening before the fete-day Luther published upon the door of the Schloss-kirche his ninety-five theses which led to the movement known as the Protestant Reformation. These theses were called forth by Tetzel's abuse of the church doctrine regulating indulgences. Their tone was, however, moderate and it seems that at this time Luther contemplated no break with the church. But by means of the press, the theses were scattered with remarkable rapidity through Europe and all the con-

tinent was soon plunged into a tumult of controversy. Luther, meanwhile, devoted himself to the further study of the Bible, church history and canon law, in order to defend the position he had taken. His study resulted in his drifting farther and farther from the church. His public utterances and writings became bolder and he was soon attacking the entire system and body of teachings of the Church of Rome. At first the Pope did not regard the matter as of serious import; but at length, being convinced that Luther's influence was becoming dangerous, issued a bull against him and his friends. His writings were condemned as heretical and he himself, if he did not recant his errors in sixty days, was to be seized and sent to Rome to be tried for heresy. Luther publicly burned this communication. In 1521 the Diet of Worms, an assembly of the princes, nobles and clergy of Germany, was convened by the Emperor Charles V to deliberate upon State affairs in general and especially upon matters touching the great religious controversy. Luther was summoned before this body and called upon to recant his errors. Refusing to do so, he was pronounced a heretic and outlaw, but was allowed to depart in safety. Frederick, elector of Saxony, conveyed him privately to the Wartburg Castle, where he remained for ten months in seclusion and translated the New Testament into German. Meanwhile serious troubles arose from the excesses of fanatical professed followers of Luther. Castles and monasteries were sacked and horrible outrages were perpetrated. Although a legal outlaw, Luther now came forth and temporarily checked the disturbance. He then resumed his work in the church and university and, when several years later the trouble broke out afresh, made a tour through the neighboring towns, preach- a crusade against the image-breakers. His history from this time is identical with that of the Reformation (which see). The rapidity with which his doctrines gained ground was due, it is thought, as much to his hymns as to his preaching. The most famous of these, "A Mighty Fortress is Our God," is sometimes known as the battle hymn of the Reformation. In 1524 Luther married Katharine von Bora, a former nun who for several years had been a believer in his doctrines. In the same year he established a school at Eisleben. From 1526 to 1529 he was engaged in the preparation of a new church service. His translation of the Bible in 1534 permanently established the literary language of Germany.

Luton, a municipal borough of England, county of Bedford. There are extensive manufactories for straw hats and bonnets, Luton being the principal seat of that manufacture. Pop. 30,005.

Luxemburg (GRAND-DUCHY OF), a territory connected with the Dutch crown. Grain and other crops are raised; cattle and horses are exported; iron ore is mined and smelted. The inhabitants are mostly of German origin, but French is the language of the educated classes and of business. Pop. 213,283.

Luzon', an island in the Pacific, the largest of the Philippines. Vegetation is luxuriant, and the vast forests contain ebony, cedar, and other valuable trees. Luzon also produces abundant crops of rice, Manilla hemp, tobacco, coffee, ginger, and pepper. There are few wild animals except the buffalo, which is also domesticated; but oxen, sheep, and swine are reared. The population consists of the aboriginal Negritos, and of Malays, Chinese, Spaniards, etc., and the whole is estimated at about 3,400,000. The capital is Manila.

Lycan'thropy (Greek *lykos*, a wolf, and *anthrōpos*, a man), a kind of erratic melancholy or madness in which the patient imagines himself to be a wolf and acts in conformity with his delusion. Great numbers were attacked with this disease in the Jura in 1600. They herded together, and emulated the habits of the wolf, howling, walking on hands and feet, and devouring children.

Lyce'um, an academy at Athens in which Aristotle explained his philosophy. In modern times the name of *lyceum* has been given to the schools intended to prepare young men for the universities.

Lyc'ia, an ancient maritime province in the s. of Asia Minor, bounded by Caria on the w., Pamphylia on the e., and Pisidia on the n. It was colonized by the Greeks at a very early period, and its historical inhabitants were Greeks, though with a mixture of aboriginal blood.

Lycoper'don, a genus of fungi, commonly called *puff-balls.* In a young state they are edible.

Ly'copods (Lycopodiaceæ), the club-moss tribe; a natural order of vascular acrogens, chiefly inhabiting boggy heaths, moors, and woods. They are intermediate in their general appearance between the mosses and the ferns, and are in some respects allied to the Coniferæ. The lycopods occur in all parts of the globe, but grow most luxuriantly in tropical or mild climates. In the carboniferous era they attained a very large size, rivaling trees in their height and the thickness of their stems, as in the case of the Lepidodendron.

Lycur'gus, the great legislator of the Lacedæmonians, was the son of Eunomus, king of Sparta. His history commences with the year 898 B.C. when he might have usurped the throne on the death of his brother, but preferring to guard the kingdom for the unborn child of the latter, he devoted himself to the study of legislation. On his nephew becoming of age, Lycurgus traveled into Crete, Egypt, and Asia, and thus prepared himself to give Sparta the laws which have rendered his name immortal. His object was to regulate the manners as well as the government, and to form a warrior nation, in which no private interest should prevail over the public good. It is said that Lycurgus persuaded the Spartans to swear that they would observe these laws till his return from another journey, and that he then departed, and they never heard of him more. One account states that he starved

himself to death, but it is more probable that he retired to private life, and d. naturally, as Lucian records, at the age of eighty-five.

Lyd'ia, in ancient geography, a large and fertile country of Asia Minor, divided from Persia by the river Halys (now Kizil Irmak). It attained its highest prosperity under the Mermnadæ dynasty, beginning with the half mythological Gyges (716 B.C.), and ending with Crœsus (546 B.C.), who was conquered by the Persians under Cyrus. The Lydians are credited with the invention of certain musical instruments, the art of dyeing wool, also the art of smelting and working ore. Sardis was the capital.

Lydian-stone, a siliceous flinty slate, having the appearance of black velvet, found in many countries, but first brought from Lydia and used as a touch-stone.

Lye, water impregnated with alkaline salt imbibed from the ashes of wood, or any solution of an alkali used for cleaning purposes, as for types after printing, ink-rollers, etc.

Ly'ell, SIR CHARLES (1797–1875), British geologist, b. at Kinnordy, Forfarshire. He was educated at Oxford, where he graduated as B. A. and M. A.; began to study law, but afterward resolved to devote his time and fortune to geological research. For this purpose he visited the continent of Europe and the U. S. His first important work was the *Principles of Geology* (1830–33), and a portion of this book afterward formed the basis of the *Elements of Geology*. Another important work was the *Antiquity of Man* (1863), in which he summarized the evidence in favor of the theory that the race of man was much older than was currently believed. Lyell was knighted in 1848, and made a baronet in 1864. His life and letters were published in 1881.

Lyme Grass, the popular name of certain grasses. One species, *Elymus arenarius*, is a native of Britain. They are all coarse grasses.

Lymph, in physiology, the fluid resulting primarily from the assimilation of food, and also obtained from the blood and tissues, and which is contained within a system of vessels called *lymphatics* and *lacteals*. The clearest and simplest view of the lymphatic system is to consider these vessels as the media through which matters are absorbed from the alimentary canal on the one hand, and from the blood and tissues on the other. The matters so absorbed are elaborated and converted in the *lymphatic glands* into *lymph*, a fluid which presents the essential features of the more highly elaborated blood, and which is ultimately poured into the blood mainly through the *thoracic duct*. Through this system the continual loss which the blood and body suffer is made good. The lymph as it exists in the lymphatic vessels is a colorless, transparent fluid, destitute of smell. The lymphatic glands are highly important structures, for it is only after passing through them that the lymph is fully elaborated and ready to enter the blood. Their average size is that of a small almond, and they are generally arranged in groups. As distinguished from the lymphatics the lacteals are the vessels by which the chyle is absorbed from the small intestine and elaborated in the lymphatic glands of the mesentary to be afterward poured into the thoracic duct. This duct pours its contents into a large vein at the root of the neck. Lymphatic vessels and glands are numerous throughout the body.

Lynchburg, Campbell co., Va., on the James River and canal, 124 mi. s. w. of Richmond. Railroads: Richmond & Danville, Ches. & Ohio; and Norf. & Western. Industries: large tobacco manufactories, flour mills, iron works, sash, door, blind, and furniture works. It is the center of a tobacco-growing district. Coal and iron are found. Pop. 1900, 18,891.

Lynch Law, the practise of punishing men for crimes or offenses by private unauthorized persons without a legal trial. The origin of the phrase has been variously accounted for, but it is evidently derived from some person named Lynch, who adopted a rough and ready mode of punishing offenders.

Lynn, Essex co., Mass., on Massachusetts Bay, 10 mi. n. e. of Boston. Railroads: Boston & Maine; Eastern division Boston, Revere Beach & Lynn; Lynn & Boston electric street railway. Industries: general electric co., four iron foundries, 134 shoe factories. Surrounding country agricultural. First iron foundry was erected in 1643. Shoemaking was begun in 1657 and is the chief industry. The town was first settled in 1629 and became a city in 1850. Pop. 1900, 68,513.

Lynx, the popular name of several species of feline carnivora, resembling the common cat,

The Lynx.

but with ears longer and tufted with a pencil of hair, and tail shorter. The lynxes have been long famed for their sharp sight, which character they probably own to their habit of prowling about at night, and their brilliant eyes. The European lynx is the *Felis lynx*, the Canadian lynx is the *F. canadensis*. In Asia lynxes are tamed for hunting.

Lyon, NATHANIEL (1818–1861), was b. in Ashford, Conn., educated at West Point, became lieutenant of infantry, and served in the Seminole War. In the Mexican War he was made captain. At the beginning of the Civil War he

was stationed at St. Louis and by his prompt action did much toward keeping Missouri on the Union side. He was killed at the battle of Wilson's Creek.

Ly'ons (French, *Lyon;* Latin, *Lugdunum*), the second city in France, capital of the department of the Rhône, 240 mi. s.s.e of Paris, and 170 mi. n. of the Mediterranean. Among the chief buildings are the cathedral, mostly of the thirteenth century; the church of St. Martin d'Ainay, with a cupola supported by ancient Roman columns, and a crypt believed to be of the ninth century; the church of St. Nizier, a fine example of flamboyant Gothic; the Hôtel de Ville, Palais de Justice, etc. Lyons carries on various industries, but its chief glory is that of being the greatest center of the silk manufacture in the world, giving employment in the town or surrounding neighborhood to 240,000 people. There is also a large trade by railway, river, and canal. During the revolution the city suffered severely by the paralysis of its industry, and by the murderous excesses of the emissaries of the Paris Convention, whom the citizens had defied, the chief buildings being destroyed and many of the inhabitants butchered. Outbreaks among the industrial population took place in 1831, 1834, and 1840. Pop. 401,900.

Lyons, Gulf of (in French, *Golfe du Lion*), a bay of the Mediterranean, on the southeastern coast of France. The principal ports on this gulf are Toulon, Marseilles, and Cette.

Lyons, Clinton co., Ia., on the Mississippi River, 78 mi. below Dubuque. Railroads: C. M. & St. P., and C. & N. W. Industries: several large sawmills, iron and brass works, extensive sash and door works. It is now a part of Clinton.

Lyre, one of the most ancient stringed instruments of music, consisting of a body with two horn-like pieces rising from it, and a cross-piece between the horns, from which to the lower part the strings were stretched. It was used by the Egyptians, Assyrians, and Greeks. It is said to have had originally only three strings, but the number was afterward increased to seven, then to eleven, and finally to sixteen. It was played with the *plectrum* or lyre-stick of ivory or polished wood, also with the fingers, and was used chiefly as an accompaniment to the voice. The body of the lyre was hollow, to increase the sound. A musical instrument of similar construction is still to be met with in the hands of the shepherds of Greece and among certain tribes of Africa.

Lyre Bird, an insessorial bird of New South Wales, somewhat smaller than a pheasant. The tail of the male is remarkable for the three sorts of feathers that compose it, which by their shape and arrangement resemble the form of an ancient Greek lyre. It has a pleasing song, and is said to be capable of imitating the voices of other birds.

Lyric Poetry, originally, poetry sung to or suited for the lyre; in modern usage, that class of poetry in which are expressed the poet's own thoughts and feelings, or the emotions attributed to another, as opposed to epic or dramatic poetry, to which action is essential.

Lysan'der, an ancient Greek general who was appointed to the command of the Spartan fleet off the coast of Asia Minor in 407 B. C., during the Peloponnesian War. In 405 B. C. he defeated and captured the Athenian fleet off Ægospotamos, and thus put an end to the war. He was killed in a battle with the Thebans 395 B. C.

Lys'ias (B. C. 458–378), an Athenian orator. He studied philosophy and eloquence at Thurii in Magna Græcia, and was there employed in the government. On the defeat of the Athenians in Sicily he returned to Athens in 412, but was banished by the thirty tyrants. When the city recovered its freedom he returned in 403, and gave instruction in eloquence, also writing speeches for others to deliver. Only about thirty of his numerous orations have been preserved.

Lyre Bird.

Lysima'chia, a genus of herbs, nat. order Primulaceæ. Four species occur in U. S., known by the name of loosestrife, and one is called prairie money-wort.

Lysip'pus, a Greek sculptor who flourished in Sicyon about 330 B. C., in the time of Alexander the Great.

Lythra'ceæ, the loosestrife tribe, a nat. order of polypetalous exogens, containing about thirty genera of herbs, trees, and shrubs, of various habit, often with square branches; the leaves usually are opposite or whorled, entire, and shortly petiolate; the flowers being often large and showy. Henna and tulipwood belong to the order.

Lytton, Edward George Earle Lytton, Bulwer-Lytton, Baron (1805–1873), youngest son of General Bulwer of Woodalling, and Elizabeth Barbara Lytton of Knebworth. He entered Trinity Hall, Cambridge, graduated B. A. in 1826, M. A. 1835, and gained the chancellor's prize medal for his English poem on Sculpture. He published poetry at an early age, but first gained reputation by the novels *Pelham, Disowned, Devereux,* and *Paul Clifford.* These were followed up with the popular romances of *Eugene Aram,* the *Pilgrims of the Rhine, The Last Days of Pompeii, Rienzi,* and *Ernest Maltravers* with its sequel *Alice.* In connection with Macready's management Covent Garden Bulwer-Lytton produced his

Duchess de la Vallière, which proved a failure, but this was retrieved by the instant success of the *Lady of Lyons*, *Richelieu*, and *Money*. When he had thus shown his quick adaptability of talent he returned to novel writing, and published in steady succession, *Night and Morning*, *Zanoni*, *The Last of the Barons*, *Lucretia*, *Harold*, *The Caxtons*, *My Novel*, and *What will He Do with It?* In 1845 he published a poetical satire called *The New Timon*, in which he attacked Tennyson, who replied more vigorously than had probably been expected. He entered Parliament for St. Ives in 1831, and supported the Reform bill as a Whig; but he changed his opinions and latterly supported the Conservatives. Under Lord Derby's ministry he was colonial secretary, and in 1866 entered the House of Lords as Baron Lytton. He was elected rector of Glasgow University in 1856. His later literary works were, *The Coming Race*, published anonymously, *The Parisians* and *Kenelm Chillingly*. Among his poetic works were the epic *King Arthur;* the *Lost Tales of Miletus; Brutus*, a drama, etc.

Lytton, The Right Hon. Edward Robert Bulwer-Lytton, Earl of (1831–1891), son of the novelist and politician, was educated at Harrow and Bonn; entered the diplomatic service in 1849 as attaché at Washington, and successfully served in the embassies of Florence, Paris, The Hague, St. Petersburg, Constantinople, Copenhagen, and Lisbon. He was appointed viceroy of India by the government of Mr. Disraeli in 1876, and it was during his administration that the queen was proclaimed Empress of India. This post he resigned in 1880, being then created an earl. He early attained a certain reputation as a poet under the pen name of "Owen Meredith;" and has published *Clytemnestra and Other Poems*, *Lucile*, *Tannhäuser, or the Battle of the Bards*, *Fables in Song*, and *Glenaveril*, besides prose works, including the life and letters of his father. Ambassador to Paris in 1888.

M

M is the thirteenth letter and tenth consonant of the English alphabet. It represents a labial and nasal articulation, the compression of the lips being accompanied with the fall of the uvula so as to allow the voice to form a humming sound through the nose, which constitutes the difference between this letter and *b*.

Mab, a mythical personage often represented as queen of the fairies.

Macad'am, JOHN LOUDON (1756–1836), the great improver of roads, was b. at Ayr. Having spent his early years in the U. S., he returned to Great Britain and was appointed agent for victualling the navy in the western ports. In 1815 he was appointed surveyor of the British roads, and thus received the opportunity to put his road-making improvements into practise. He was so successful in this that the House of Commons presented him with a sum of $10,000, and his mode of road making is still known as Macadamization. This method consists in covering the roadway or forming the road-crust with small broken stones to a considerable depth, and consolidating them by carriages working upon the road, or by rollers, so as to form a hard, firm, and smooth surface.

Maca'o, a seaport town and Portuguese settlement in China, on a peninsula at the mouth of the Canton River, about 40 mi. from Hong-kong, considered the healthiest residence in Southeast Asia. The settlement has an area of about 21 sq. mi., and its principal export is tea. Its commerce has greatly declined since the rise of Hong-kong, and the Chinese treaty ports. It was in 1575 that the Portuguese first obtained permission to form a settlement, and to trade at Macao, and in 1844 it was declared a free port. Pop. about 72,000.

Macaro'ni (Maccaroni), a preparation of wheaten flour, used as food, usually simply boiled and served up with grated cheese, or in soups, etc. Macaroni is generally made in tubular pieces resembling a long pipe-stalk by pressing it through holes in a metal plate. *Vermicelli* is a similar preparation, but is more thread-like. Macaroni is a wholesome food, made best in the neighborhood of Naples, and considered a national dish of the Italians. Macaroni was used as a term of contempt for a coxcomb or swaggerer about 1770–1775.

In the manufacture of macaroni only the hardest and flintiest wheat is used. It is first washed and carefully dried and is then ground or pounded into coarse cracked wheat and put into a revolving screen. This screen makes the first separation, dividing the starch, bran, and hard parts of the wheat. This broken wheat is sifted through a number of sieves, beginning with a coarse mesh and ending with a fine mesh. The wheat is then made into dough. The coarse flour is mixed with warm water and kneaded by means of a lever. After kneading and working it for an hour, the dough is ready to be made into tubes. The dough is placed in an upright cylinder with the top open and the bottom closed with a perforated plate, the holes being the exact size of the macaroni sticks. The dough is put into the cylinder and a plunger put on top and forced down by means of a lever, and the soft, pliable macaroni tubes shoot through the perforated plate. The sticks are made hollow by means of little round plugs or centers which are held in the holes by pins. The plugs are smaller than the holes through which the dough is forced, so that the dough is really squeezed through a ring-shaped hole. While the macaroni sticks are being pushed through the perforated plate they are fanned briskly so that they will not stick together. They are cut off about every 10 ft. and hung over wooden frames where they are kept until the macaroni is dry, hard, and brittle. This is the original method of making macaroni.

McArthur, ARTHUR, a major-general in the United States army. He entered military service in 1862, with the 24th Wisconsin Infantry. In 1866 he was commissioned first lieutenant in the regular army. At the beginning of the Spanish War he was made brigadier-general of volunteers and sent to Havana. The following year he was sent to the Philippines, and on the retirement of General Otis became commander of the forces in the Philippines and military governor of the islands. He was made major-general in Feb., 1901.

Macassar, STRAITS OF, between Celebes and Borneo, about 350 mi. long, and from 110 to 140 wide, except at the north entrance, where it is contracted to 50 mi. Navigation is difficult because of the numerous shoals and small islands.

Macau'lay, THOMAS BABINGTON, LORD (1800–1859), historian, essayist, and politician, was b. at Rothley Temple, Leicestershire, and d. at Kensington. In 1818 he entered Trinity College, Cambridge, where he obtained the Chancellor's medal for a poem on *Pompeii*, and a second time for a poem on *Evening;* received a fellowship and took his M. A. degree in 1825. Before this he began to contribute to *Knight's Quarterly Magazine*, in which appeared his poems of the *Armada*, *Ivry*, and the *Battle of the League;* and in 1825 he inaugurated his brilliant career in the *Edinburgh Review* by his article on *Milton*. In 1842 he published his *Lays of Ancient Rome;* and in 1848 appeared the first two of the five volumes of his *History of England*, which covers the period between the

accession of James II and the death of William III. This brilliant rhetorical exposition, although touched with partisanship and with a tendency to paradox, has attained the position of an English classic. He was created a peer in 1857, and at his death he was buried in Westminster Abbey. *The Life and Letters of Macaulay* has been published by his nephew, Sir Geo. Otto Trevelyan (1876).

Macaw', a genus of beautiful birds of the parrot tribe. The macaws are magnificent birds, distinguished by having their cheeks destitute of feathers, and their tail feathers long. They are all natives of the tropical regions of South America. The largest and most splendid in regard to color is the great scarlet or red and blue macaw. The great green macaw and the blue and yellow macaw are somewhat smaller.

Macbeth', (Macbeda, or Macbethad), son of Finnlaech, a king of Scotland who reigned from 1040 to 1057. The facts of his life, so far as they are known, are these: During the reign of Duncan he was "mormaer" of Moray by inheritance, and by his marriage with Gruoch, grand-daughter of Kenneth IV. This Duncan, in his attempt to subdue the independent chiefs of the north, was slain by Macbeth at "Bothgowan," which is supposed to be near Elgin. By this means Macbeth became king, and, according to all accounts, his reign was fairly successful. In 1050 he is said to have gone on a pilgrimage to Rome. At the death of their father the sons of Duncan had taken refuge with their uncle Siward, earl of Northumberland, and with his aid they invaded Scotland in 1054; a battle was fought at Dunsinane, but it was not until 1057 that Macbeth was finally defeated and slain at Lumphanan in Aberdeen. The legends which gradually gathered round the name of Macbeth were collected by John of Fordun and Hector Boece, and reproduced by Holinshed in his *Chronicle*, and there found, as is supposed, by Shakespeare, who has made such splendid use of them.

Mac'cabees, a dynasty of ruling Jewish priests of whom the first who came into prominence was Mattathias. When Mattathias d. (166 B.C.) his sons Judar and Jonathan became successively leaders of the national movement. The last remaining member of the family was Simon, who now carried forward the national cause to a triumphant issue, reduced "the tower" of Jerusalem, and established the power of the new state. Under his rule trade and agriculture flourished, until (in 135 B.C.) he was treacherously murdered by Ptolemy, his own son-in-law.

M'Carthy, JUSTIN M. P. (1830–), novelist, historian, and politician, was b. at Cork. He traveled for three years in the U. S.; contributed to various English and American magazines, and was connected with the *Daily News* 1870–85. His novels are numerous, and his historical writings include *History of Our Times, 1837–80*, *History of the Four Georges*, etc.

McClellan, GEORGE BRINTON (1826–1885), an American general, b. at Philadelphia. He was trained at West Point; served in the Mexican War; joined the Red River expedition as engineer; and in 1855 was appointed to the commission which reported on the condition of European armies, and watched the military operations during the Crimean War. At the outbreak of the Civil War in the states he superseded M'Dowell after the first battle of Bull Run; and became commander in chief on Nov. 1, 1861. In this capacity he organized the raw levies of the North, and advanced against Richmond the following spring, but was relieved from his supreme command by President Lincoln in 1862, and thenceforth led the Army of the Potomac in a series of engagements which terminated in the Seven Days' Battle, when he had to retire from his lines in front of Richmond. Afterward, when Lee advanced into Maryland, McClellan fought the battles of South Mountain and Antietam (Sept. 14–17, 1862), and compelled the Confederate forces to retire. The political authorities being dissatisfied with his apparent slackness in following up this victory, McClellan was relieved from his command and retired from the army. In 1864 he was nominated for the presidency, but was overwhelmingly defeated by Abraham Lincoln.

Macclesfield, a town of England, Cheshire, 17½ mi. s. by e. of Manchester, on the Bollin. The staple manufacture is silk, and the cotton manufacture has also made some progress. In the vicinity are extensive coal pits and stone and slate quarries. Pop. 36,009.

MacClintock, VICE ADMIRAL SIR FRANCIS LEOPOLD, K. C. B. (1819–), b. at Dundalk; entered the navy in 1831; became a lieutenant in 1845; and in 1848 joined the expedition sent out by the British government in search of Sir John Franklin, the Arctic explorer. In 1852 he was instrumental in rescuing MacClure and his companions. In 1857, as commander of the *Fox*, a vessel equipped by Lady Franklin, he discovered evidence of the death of Franklin. In 1884 he became admiral.

McCormick, CYRUS H. (1809–1884), inventor, was b. in Walnut Grove, Va. In 1831 he built the reaping machine, which with his improvements has done so much for the cause of agriculture.

MacCosh, JAMES (1811-94), D. D., LL.D., was b. in Ayrshire; became a minister of the Church of Scotland first at Arbroath then at Brechin; joined the Free Church after the disruption movement; was appointed professor of logic and metaphysics in Queen's College, Belfast, 1851; was president of Princeton College, New Jersey, from 1868 to 1888, when he resigned. He has written various works on philosophy and psychology, and among others the *History of Scottish Philosophy;* the *Development Hypothesis;* the *Emotions* (1880); and *Psychology, the Cognitive Powers* (1886).

MacCulloch (M'Culloch), JOHN RAMSAY (1789–1864), a political economist and statistician. He was for some time editor of the *Scotsman* newspaper and contributed largely to the Edinburgh *Review*. In 1828 he was ap-

pointed professor of political economy in London University, became comptroller of the stationery office in 1838. Among his numerous works are *The Principles of Political Economy; Historical Sketch of the Bank of England; Dictionary of Commerce; Geographical Dictionary; A Treatise on the Principles and Practical Influence of Taxation and the Funding System; The Literature of Political Economy*, and the works of Ricardo with a memoir.

Mac Donald, GEORGE, LL.D. (1824–), English novelist and poet. Among his numerous novels are *David Elginbrod, Alec Forbes, Annals of a Quiet Neighborhood, Robert Falconer, Malcolm, The Marquis of Lossie, Castle Warlock*, etc. He has also published a good deal of poetry, stories for the young, *Unspoken Sermons*, etc. In 1872–73 he made a lecturing tour of the U. S.

Macdonald, SIR JOHN ALEXANDER (1815–1891), K.C.B., D.C.L., Canadian statesman, was b. in Scotland. He became premier of Canada in 1869, a position which he held until 1873, when he resigned over the Pacific Railway Charges, but resumed the office again in 1878, and retained it until his death. He was an active promoter of the Canadian Pacific Railway and the Canadian confederation movement, and was a recognized leader of the Conservative party.

Mace, a spice, the dried aril or covering of the seed of the nutmeg, this covering being a fleshy, net-like envelope somewhat resembling the husk of a filbert. When fresh it is of a beautiful crimson hue. It is extremely fragrant and aromatic, and is chiefly used in cooking or in pickles.

Macedonia, in ancient geography, a territory lying to the north of Greece, which first became powerful under its king Philip, the father of Alexander the Great, and conqueror of Greece. Alexander the Great added immensely to the empire of Macedonia, and made, what had only been a petty province, mistress of half the world. After his death the empire was divided; dominion was lost over Greece; and the result of the battles of Cynoscephalæ (197 B.C.) and Pydna (168 B.C.) was to reduce the ancient kingdom to a Roman province. Macedonia now forms a part of Turkey in Europe, and is inhabited by Wallachians, Turks, Greeks, and Albanians.

Maceio (mâ-sā-′i-o), Brazilian seaport, capital of prov. Alagoas, on the Atlantic, lat. 9° 39′ s. Chief exports: cotton, rum, and sugar. Pop. 12,000.

Maceo, ANTONIO, b. in Santiago de Cuba, and d. Dec. 4, 1896, from wounds received in battle. He took part in the Cuban War from 1868 to 1878, and was made major general of cavalry. He went to Costa Rica and returned in 1888 to raise another insurrection. At the outbreak of the Cuban rebellion in 1895 he joined the forces of Gomez.

Macerata (mâ-che-rä′tà), a town in Italy, capital of the province of the same name, on a lofty eminence midway between the Apennines and the sea, 21 mi. south of Ancona. The principal buildings are the cathedral, provincial palace, and theater, all situated in a large public square, various churches and convents, a college, museum, etc. Pop. 20,263. The province, bounded n. by Ancona, w. by Umbria, s. by Ascoli, and e. by the Adriatic, has an area of 1,056 sq. mi., produces much corn, fruit, and hemp, and rears great numbers of sheep and cattle. Pop. 250,368.

Macfar′ren, SIR GEORGE ALEXANDER (1813–1887), musical composer, b. in London. He was educated at the Royal Academy of Music; became a member of the board of the academy, and ultimately chairman and principal; was elected professor of music, Cambridge University, and was knighted by the queen in 1883. His chief operas are *The Devil's Opera, Don Quixote, Robin Hood* (1860). He also essayed the cantata of *Lenore* (1852), and *The Lady of the Lake;* while his oratorios are *St. John the Baptist, The Resurrection* (1876), *Joseph*, and *King David* (1883). He also wrote several musical treatises.

M′gee (-jē′), THOMAS D'ARCY (1825–1868), b. at Carlingford, Ireland; became prominent in the Young Ireland party, and had to make his escape to the U. S., where he soon made a name as a journalist. His views then underwent a change; he became an ardent royalist, went to Canada, and entered parliament in 1857. In 1864 he became president of the executive council, and up till near his death took a prominent part in the measures of the day. Obnoxious to the Fenians, he was assassinated by a member of that body.

Macgil′licuddy Reeks, a picturesque mountain-range of Ireland, in the county of Kerry, extending for 13½ mi. from the lakes of Killarney on the east to Lough Carra on the west. It is the loftiest mountain range in Ireland; Carrantual, the highest peak, rises 3,404 ft. above sea-level.

Machiavelli (mâk-yâ-vel′lē), NICOLO (1469–1527), a distinguished Italian statesman and historian, b. at Florence. He became prominent in public affairs in 1498, when he was appointed secretary to the Ten at Florence. For more than fourteen years he guided the destinies of the Florentine Republic, undertook embassies, concluded treaties, and jealously conserved the rights and liberties of his native city. When the Medici returned to power in 1512 by aid of Pope Julius II, Machiavelli was deprived of his office, and retired to his country house of San Casciano. Here he devoted himself to literary labor, the chief results of which are found in his *History of Florence*, embracing the period between 1215 and 1492; *Discourses upon the Ten First Books of Livy; The Prince* (*Il Principe*), by which he is best known; a military treatise entitled *Dell' Arte della Guerra;* and the comedies of *La Mandragola* and *La Clizia*. The name of Machiavelli was for long synonymous with all that is tortuous and treacherous in state affairs.

Machine Gun, a name given to any of those pieces of ordnance that are loaded and fired mechanically, and can deliver a number of projectiles simultaneously or in rapid succession, having usually a number of separate barrels.

The first of these to come into prominence in warfare was the French mitrailleuse (or mitrailleur), which was employed in the Franco-German War. The Gatling gun first appeared in the U. S., and was speedily adopted by Britain and other powers, with modifications. Other guns of this kind are the Hotchkiss, the Nordenfeldt, and the Gardner gun. Such guns, while having their own use in warfare by land, are regarded as being of special value in marine warfare, and are intended mainly for use against torpedo boats. The Gardner gun may be mounted in various ways—on a gun carriage, or on a tripod stand the legs of which can be screwed down to a ship's deck. As to absolute rapidity of fire the Nordenfeldt has slightly the superiority; yet the two-barrel Gardner can fire 236 rounds, the five-barrel Gardner 330 rounds in half a minute, while as regards reliability for continuous work and ease and rapidity of fire the Gardner gun has manifested a marked superiority over the Nordenfeldt. The latter is fired by a handle with a reciprocating motion, while the Gardner is fired by a handle with a rotary motion, which is the same whatever the elevation or depression of the gun. The Hotchkiss gun fires heavier projectiles (hollow percussion shells) than the other machine guns, the fire being continuous. It may be described as consisting of a gun metal frame in which five Whitworth steel barrels revolve with intermittent motion, having a single firing action and cast-iron breech. The barrels become stationary at the moment of firing, loading, and extracting the empty cartridges. A more recent machine gun is the Maxim, which, after the first shot is fired by hand power, continues to fire shot after shot by means of the power derived from the explosion of each successive cartridge.

Mackay, JOHN W. (1831–1902), was b. in Dublin, Ireland. After a miner's life in California, in 1860 he went to Nevada. In 1872 he was one of the discoverers of the Bonanza mines, of which he owned two fifths. Their production has been enormous. In 1884, with James Gordon Bennett, he founded the *Commercial Cable Company.* Died July 20, 1902.

McKenna, JOSEPH, American jurist and statesman, b. 1843 in Philadelphia, Pa. The family removed to California in 1855. He studied law and was admitted to the bar when twenty-two years old. He served several terms as prosecuting attorney and was a member of the state legislature. He was elected to Congress in 1884, and held his seat until 1892, when he was appointed U. S. Circuit Judge in California by President Harrison. In 1897 he was appointed attorney general, and in 1898 a justice of the supreme court.

McKeesport, city in Allegheny co., Pa., 15 m. s. e. of Pittsburg; at the junction of the Monongahela and Yonghiogheny rivers, and on the B. & O., the Pennsylvania and the Pittsburg and Lake Erie railroads. It is in the center of the natural gas and the bituminous coal regions. The chief industrial establishment is a great iron and steel plant which employs over 8,000 men. There are also other iron and steel works, locomotive and railroad car works, glass works and lumber mills. The city has a large trade in coal and lumber. It is the seat of Douglas Industrial College, and has a hospital and a Carnegie library. Pop. 1900, 34,227.

Macken'zie, SIR ALEXANDER (1755–1820), Canadian explorer, b. at Inverness, Scotland. In the employment of the Northwest Fur Company he explored the great river named after him from the western end of Great Slave Lake to the Arctic Ocean (1789). He made another expedition to the western coast (1792), and was the first white man to cross the Rocky Mountains and reach the Pacific coast.

Mackenzie, ALEXANDER (1822–1892), Canadian statesman, b. in Logierait, Perthshire, Scotland. Originally a stone mason, he emigrated to Kingston, Canada, in 1842, and began business as a builder and contractor. In 1852 he was editor of a Liberal newspaper, and he entered Parliament in 1861, becoming leader of the Liberal party in 1873. On the resignation of Sir John Macdonald that same year he became premier, and retained office with much success till 1878. He has more than once declined the honor of knighthood.

Mackenzie, ALEX. CAMPBELL (1847–), composer, b. at Edinburgh; received his musical education partly in Germany. He became principal of the Royal Academy of Music in 1888. He is the author of the oratorio, *The Rose of Sharon* (1884), the operas, *Colomba* (1884), and *The Troubadour* (1886), the *Cantata of the Story of Sayid* (1886), *The Dream of Jubal* (1889), etc.

Mackenzie, SIR MORELL, M. D., (1837–1892), b. at Leytonstone, Essex; educated at London Medical College, Paris, and Vienna; obtained the Jackson prize for diseases of the larynx; became physician to the London Hospital, and lecturer on diseases of the throat. In 1887–88 he was associated with the specialists of Berlin and Vienna in the treatment of the larynx disease of the Emperor Frederick (at first, while he was Crown Prince) of Germany. He is the author of a treatise on *Diseases of the Throat and Nose* and several other works.

Mackenzie River, a large river in the Northwest Territories of Canada, which flows out of Great Slave Lake, first west, then north, finally northwest; and after a course of about 1,200 mi. falls into the Arctic Ocean by numerous mouths. Its principal affluents, including the feeders of Great Slave Lake, are the Athabasca, the Peace, the Liard, and the Peel, and it is navigable throughout its course. It was discovered by Alexander Mackenzie in 1789.

Mackerel, one of the spiny finned fishes, a well-known and excellent table fish, which inhabits almost the whole of the European seas. Mackerel, like herring, are caught only when they approach the shore to spawn, nets being chiefly used. The common mackerel of our coasts is of a dark green color above, shading to a darker color below the water line. Massachusetts and Maine are the states where the fishing is carried on most extensively.

McKinley, WILLIAM, 25th president of the

U. S., b. in Niles, O., Jan. 29, 1843, received his early education at the Poland Seminary in the same state, and in 1860 entered Allegheny College, Meadville, Pa., but ill health compelled him to discontinue his studies the first year. After teaching school for a short period, he enlisted, in June, 1861, in the twenty-third Ohio Infantry, under command of Colonel (subsequently General) W. S. Rosecrans, and served through the war, gaining the rank of brevet major. He returned to Poland at the close of the war, began the study of law, and was admitted to the bar in 1867. Entering on the practise of law in Canton, O., he soon mingled in politics, and became a leading stump speaker in the state. He was elected prosecuting attorney, in 1869, and in 1876 member of Congress, and re-elected successively until 1882. With one exception he continued to hold his seat in Congress until 1890. He was elected governor of Ohio in 1891, and re-elected in 1893 by a majority of 80,000. In June, 1896, he was nominated by the Republican National Convention at St. Louis for president, and elected by a vote of 271 in the electoral college to 176 for William J. Bryan, his democratic opponent. On the 4th of March, 1897, he was inaugurated, and selected for the two leading positions in his cabinet Senator John Sherman, of Ohio, the veteran Republican leader, as secretary of state, and Lyman J. Gage, a distinguished financier, of Illinois, as secretary of the treasury. The distinguishing characteristics of Mr. McKinley's long career as a public man were his firm and perspicuous advocacy, on the floor of Congress, as well as on the hustings of the policy of protection to American industry, and also of sound money as the basis of the financial policy of the country. In the presidential canvass of 1896 those in both parties in favor of a gold basis rallied to his support, under the fear of a financial revulsion and disaster in case of the election of his opponent, therefore he received more than the average vote of his party. He was re-elected in 1900 with increased majorities, receiving 292 of the 477 electoral votes. As a public speaker Mr. McKinley was clear, terse and forcible; as a statesman he showed at all times a close comprehension of public issues. His second term had an auspicious beginning, and his foreign and domestic policies were received with favor. On Sept. 5, 1901, Mr. McKinley visited the Pan-American Exposition at Buffalo, to deliver an address in fulfillment of a previous engagement. On Sept. 6 he held a public reception in the Temple of Music, and during this reception was shot and fatally wounded by Leon Czolgosz, an anarchist. He died Sept. 14, and was buried at Canton, O., Sept. 19. For five minutes at the hour of his interment all business ceased throughout the land. Pl. I, Vol 1.

McLean, JOHN, American jurist (1785–1861). He was admitted to the bar in 1807 in Ohio, and served in Congress from 1812 to 1816. In 1816 he was elected judge of the Ohio Supreme Court. He was postmaster general under President James Monroe, also under John Quincy Adams, and became associate justice of the U. S. in 1830. He published a eulogy of James Monroe.

Macmahon (mak-mȧ-hōn), MARIÉ EDMÉ PATRICK MAURICE DE (1808–1893), duke of Magenta and marshal of France, educated at the military college of St. Cyr. At the outbreak of war between France and Germany (1870) Macmahon was placed in command of the First Army Corps, which was defeated at Weissenburg, Wörth, and finally fell back upon Châlons. Here he rallied his forces, and proceeded northeastward to relieve Bazaine, who was besieged in Metz, but he was pursued by the Germans, shut up by their encircling armies in the town of Sedan, and wounded in the battle before the final surrender. After the armistice with Germany he was employed by the Versailles government in putting down the Commune, and in 1873 he was elected president of the republic, a position which he occupied until 1879.

McMonnies, FREDERICK, b. in Brooklyn in 1863. He studied at first under St. Gaudens, and in 1884 went to Paris. His first work was exhibited in France in 1889 and was accorded honorable mention. His best known works are the *McMonnies Fountain*, at the World's Columbian Exposition; *Sir Harry Vane*, in the Boston Public Library, and *Shakespeare*, in the Congressional Library at Washington.

Macomb, McDonough co., Ill., 206 mi. s. w. of Chicago. Railroad, C. B. & Q. Industries: sewer pipe works, iron foundry, flour mill, four potteries, and agricultural implement factory. Surrounding country agricultural. The town was settled in 1829 and became a city in 1856. It has a normal school. Pop. 1900, 5,375.

Macon, Bibb co., Ga., on the Ocmulgee River, 103 mi. s.e. of Atlanta. Railroads: East Tennessee; Virginia & Georgia; Central of Georgia; Southern; Georgia Southern & Florida. Industries: cotton mills, brass and iron foundries, machine shops, railroad shops, and sash and blind works. It is a center of education, being the seat of Mercer University, Pio Nono College, Wesleyan Female College, and the State Blind Asylum. Pop. 1900, 23,272.

McPherson, GEN. JAMES B. (1828–1864), b. in Ohio. He was graduated from West Point in 1853. At the outbreak of the Civil War he entered the service under General Halleck and was made lieutenant colonel. He took an active part in the expedition against Fort Donelson, Fort Henry, and at the battle of Shiloh. In 1862 he became a member of General Grant's staff and was made major general. Later he became commander of the army of the Tennessee. He was shot in the battle of Atlanta in July, 1864, and his wounds proved fatal.

Macready (mak-rē'di), WILLIAM CHARLES (1793–1873), English tragedian, b. in London. In 1826 he made his first visit to America, and in 1828 played in Paris, with great success in both countries. He undertook the management of Covent Garden in 1837, and Drury Lane in 1842. He revisited the U. S. in 1849,

returned to England, gave a series of farewell performances, and finally retired from the stage in 1851. His *Reminiscences* appeared in 1875.

MacVeagh, WAYNE, b. in Pennsylvania in 1833, and admitted to the bar in 1856. He took an active part in the Civil War, and in 1872 was appointed minister to Turkey. President Garfield appointed him attorney general in 1881. He was appointed minister to Italy in 1893.

Madagascar, a large island in the Indian Ocean, 230 mi. distant from the e. coast of Africa, from which it is separated by Mozambique Channel; length, 975 mi.; average breadth, 250 mi.; area about 228,500 sq. mi.; pop. about 3,500,000. Madagascar may be described as an elevated region, with an average height of 3,000 to 5,000 ft., overlooked by mountains rising in some cases to nearly 9,000 ft. The coast exhibits a number of indentations, mostly small, but few good harbors, being in great part rock, though in some places low and sandy. The rivers are numerous, yet few of them offer even to a moderate extent the advantages of internal navigation. The climate is oppressively hot on the coast, but temperate on the highlands of the interior. The island is only unhealthy for Europeans in the neighborhood of lagoons or marshes. The rainy season continues from December to April. The most striking feature in the vegetation is a belt of dense forest, with an average breadth of 15 to 20 miles, passing round the whole island. It is found at all levels from 6,000 feet to the water's edge, and the trees include palms, ebony, mahogany, fig, cocoanut, and the ravinala or traveler's tree, which when pierced yields a refreshing juice. The vegetable products grown for food include rice, manioc or cassava, sweet potatoes, ground nuts, and yams. Ginger, pepper, and indigo grow wild in the woods; cotton, sugar cane, coffee, tobacco, and hemp are cultivated. India rubber, gum copal, and dyewoods are exported. Humped cattle are found in immense herds, and form a large part of the wealth of the inhabitants, as also sheep, goats, swine, and horses. The most characteristic of the mammals are the lemurs. The birds are numerous; snakes are rare; crocodiles, lizards, chameleons abound. The inhabitants, called Malagasy, belong to the Malayo-Polynesian stock and speak a Malayan language. The Hovas are the ruling tribe, they having extended their sway over nearly the whole island, while the other chief tribes are the Betsimasaraka, the Betsileo, and the Sakalava. In the coast districts the houses of the better class are built of framed timber with lofty roofs; the dwellings of the lower classes are constructed of bamboo or rushes, or even of clay. The Malagasy show much aptitude as silversmiths, gunsmiths, carpenters, and with rude looms make handsome cloths. The religion of the great bulk of the people is a kind of fetishism or worship of charms. Many of their superstitious customs have been abolished and Christianity adopted, chiefly by the Hovas, but polygamy and infanticide are still practised. The government is an absolute monarchy. The standing army consists of 20,000 men, and during the recent war with France 50,000 were mobilized. Imports and exports are valued at $4,000,000 annually. The capital is Antananarivo, in the elevated central region, with a population estimated at 100,000; the towns next in importance are Mojanga, a port on the west (pop. 14,000); and Tamatave, a port on the east (pop. 10,000). Madagascar was known to Marco Polo at the end of the thirteenth century, and in 1506 was visited by the Portuguese, who gave it the name of St. Lorenzo. Toward the end of the seventeenth and during the most of the eighteenth century the French established themselves in the island, but they were only able after a hard struggle to retain the islands of Ste. Marie on the east coast and Nossi-bé on the northwest. In the year 1810 Radama I became king of the Hovas, and with his approval Christian missionaries began to teach in the capital in 1820, many converts were made, the Bible was translated into the Malagasy tongue, the language was first reduced to a systematic written form, and printing was introduced. In 1828 he was succeeded by his chief wife, Ranavalona, a woman of cruel disposition, who persecuted the Christians and closed the island to Europeans. She was succeeded in 1861 by her son, Radama II, who reopened it to the missionaries and emancipated the African slaves. He also granted extensive territories and privileges to France, an act which offended his chiefs and led to his assassination in 1863. His wife occupied the throne five years, and on Ranavalona II becoming queen in 1868, the French brought forward their claims on the Malagasy territory, which, being refused, led to war, which resulted in a treaty (1885) by which the French received Diego, Suarez Bay for a naval station, an indemnity of $4,000,000, and the control of foreign relationships.

Madeira (mȧ-dā'i-rȧ), a Portuguese island in the North Atlantic, 360 mi. from the coast of Africa, 530 mi. from Lisbon, 1,215 from Plymouth; length, 30 mi.; breadth, 13 mi.; area about 313 sq. mi. The island is traversed by a central mountain ridge, the highest point of which reaches 6,000 ft. The staple products of Madeira are wine and sugar. The climate is equable and the island is considered an excellent sanatorium for chest diseases. The capital and chief center of trade is Funchal. The Madeiras were colonized by the Portuguese in 1431. Pop. 135,165.

Madeira, a large navigable river of South America, a tributary of the Amazon, about 800 mi. long, formed by the united streams Beni, Mamore, and Guapore on the frontiers of Brazil and Bolivia. East of the Bolivian frontier navigation is interrupted by cataracts, which it is proposed to avoid by a railway.

Madison, Dane co., Wis.; the state capital; between Lakes Mendota and Monona; 75 m. n. of Milwaukee; on the C. & N. W., C. M. & St. P. and the Ill. Cent. railroads. It was founded in 1836 and became a city in 1850. It is beautifully situated and has fine buildings for purposes of trade and elegant private residences. The state capitol a fine building sit-

uated in a square park in the center of the city, and erected at a cost of about $1,000,000, was recently destroyed by fire, but is being replaced by a larger, finer structure. Madison is the seat of the University of Wisconsin, on College Hill, a mile west of the capitol. There are several public libraries in the city, chief among them that of the State Historical Society and of the University of Wisconsin. This occupies a magnificent building on the lower college campus. The chief industries are agriculture implement, wagon and bicycle works, iron foundries and planing mills. Pop. 1900, 19,164.

Madison, Jefferson co., Ind., on the Ohio River. Railroad, P. C. & St. L. Industries: Engines, boilers, steamboats, and furniture are made here. It is in the center of an agricultural district and is an important shipping point. Pop. 1900, 7,835.

Madison, JAMES (1751–1836), fourth president of the U. S., b. at King George, Va., graduated at Princeton College in 1771, and entered upon the practise of law. He was a member of the Virginia Constitutional Convention of 1776, and a member of the state council the same year, and in 1779 was chosen as a delegate to Congress, in which he took a leading position. He was an enthusiastic supporter of the proposed measures to establish a system of general revenue for the purpose of defraying the expenses of the Revolutionary War. In 1774 he became a member of the Virginia legislature, where he did memorable service in behalf of the establishment of religious freedom. He was a member of the National Constitutional Convention of 1787, and his noted letters in the *Federalist* contributed largely to the adoption of the constitution therein framed. After a number of years spent in Congress, during which he bore always a leading part, he accepted the position of secretary of state in President Jefferson's cabinet from 1801 to 1809. In 1808 he was elected president, receiving 122 electoral votes out of 175. The war with Great Britain broke out during his first term, and he was reluctant to sign a declaration of war, but urged a vigorous prosecution of it after it was fairly under way. He was re-elected in 1812, and after the conclusion of his second term acted for many years as rector of the University of Virginia, and sat in the state convention in 1829 to revise the old Constitution.

Madon'na, a term used to designate the Virgin Mary, especially in art. It now commonly includes the Virgin with the Christ-child. This form of art was especially developed by Italian artists, particularly Botticelli, Fra Angelico, Del Sarto, Vinci, Coreggio, Titian, and above all, Raphael. Murillo was also notable for his "Madonnas." The "Sistine Madonna" by Raphael is undoubtedly his masterpiece and the greatest work of its kind extant. It represents the Virgin as Queen of Heaven holding in her arms the Christ; on either side kneel St. Sixtus and St. Catherine, and below are the two famous cherubs.

Madras', a maritime city of British India, capital of the province of the same name, on the Coromandel coast. It is ill-situated for commerce, standing on an open surf-broken shore with no proper harbor, though an area has recently been enclosed by piers so as to shelter a certain amount of shipping. Still it carries on an extensive commerce, being the terminus of railways from Bombay and the south, while it is also the headquarters of all the province departments. There are no manufactures worthy of mention, but the export and import trade amounts to over $50,000,000 annually. Madras was founded in 1639 by the English, and soon became their chief settlement on the coast. Pop. 449,950.

Madras, PROVINCE OF, includes with its dependencies and the state of Mysore the entire south of the peninsula of India. Its extreme length is 950 mi., breadth 450 mi.; area 149,092 sq. mi. It is surrounded on every side except the north by the sea, on which side it is bounded by Orissa, the Central Provinces, the territory of Hyderabad and Mysore. The three chief rivers, Godavari, Krishna, and Kaveri, rise in the Western Ghâts and enter the Bay of Bengal. The climate is varied. The soil is sandy along the coast, but there are many fertile districts; while iron, copper, lead, and coal are found in considerable quantities. There are extensive forests in the province, yielding teak, ebony, and other valuable timber trees. The principal vegetable products are rice, wheat, barley, maize, and other grains; sugar cane, areca, yam, plantain, tamarind, jack fruit, mango, melons, cocoanuts, ginger, turmeric, pepper, tobacco, oil seeds, coffee, and cotton. The wild animals met with are the elephant, tiger, chetah, jackal, wild hog, etc. The imports amount to about $45,000,000, and the exports to $65,000,000 annually. The pop. is 30,868,504, and the native protected states have in addition a pop. of 3,303,563.

Madrid (*mȧ-drid'*), the capital of Spain, in New Castle, in the province of Madrid, on the Manzanares, near the center of the Iberian Peninsula. Situated upon a high plateau, 2,450 ft. above the sea, windswept from the snowy Guadarrama, with unhealthy extremes of temperature, the city has no advantages except the fanciful geographical merit of being the center of Spain. The principal streets are broad, long, and airy; but the squares are generally irregularly built and deficient in decorative monuments. The royal palace, a combination of Ionic and Doric architecture, is one of the most magnificent in the world, being 470 ft. each way, and 100 ft. high. It contains a small but splendid Corinthian chapel, a library of nearly 100,000 volumes, and a fine collection of ancient armor and coins. The bull fights take place in the Plaza de Toros (bull ring), a building which is about 1,100 ft. in circumference, and capable of containing 12,000 spectators. The Prado, nearly 2 mi. long, a boulevard on the east of the city, forms the popular promenade, and beyond it is the park. The Royal Museum of Painting and Sculpture, in the Prado, contains more than 2,000 pictures. The National Library, founded by Philip V, contains 230,000 volumes.

The university has an average attendance of 5,000 students, and there are numerous colleges and schools, medical, military, law, etc. The manufactures are of small importance. Madrid only began to be a place of importance under Charles V, and in 1560 Philip II declared it to be the capital. It is the creation of a century, for it has not increased much since the Age of Philip IV. Pop. 387,080.

Madu'ra, an island of the Indian Archipelago, n.e. of Java, and separated from it by the Strait of Madura; 105 mi. long, and 30 mi. broad, and belonging to the Dutch. The island is not very fertile. The inhabitants, mostly Mohammedan, are governed by native princes. Cattle-rearing is the chief industry, while the chief products are maize, cocoanuts, tobacco, Jamaica pepper, and tamarinds. The principal town is Sumanap. Pop. 1,000,000.

Mæan'der, now Meinder, a river of Asia Minor, which enters the Ægean. It was celebrated among the ancients for its winding course, and has given us the verb to *meander.*

Mæce'nas, Caius Cilnius (bet. 73 and 63 B. C. -8 B. C.), a distinguished Roman. He was the companion of the Emperor Augustus in nearly all his campaigns, and his most trustworthy counselor in political matters. For the three years 18–15 B. C. he was invested with the government of Italy. His great glory, however, was as a patron of learning, and the friend of Vergil and Horace.

Maestricht (or Maastricht) (mäs'trih̲t), a town of Holland, capital of the province of Limburg, on the left bank of the Maas. It lies on the Belgian frontier, 56 mi. e. of Brussels, and 52 mi. w. by s. of Cologne. Maestricht was once one of the strongest fortresses in Europe, but its fortifications were dismantled between 1871 and 1878. Pop. 30,489.

Mag'dalen (or Magdalene), Mary, that is, Mary of Magdăla, a woman mentioned in the New Testament as having had seven devils cast out of her, as watching the crucifixion, and as having come early to the sepulcher on the resurrection morning. She was erroneously identified as the "woman who was a sinner" (Luke 7 : 37), and hence the term Magdalen came to be equivalent to a penitent fallen woman.

Magdale'na, a large river of South America which rises in the central Cordillera of the Andes, in Ecuador, flows generally north through Colombia, and falls into the Caribbean Sea by several mouths; length 970 mi. The Magdalena is navigable as far as Honda, 435 mi. from its embouchure.

Magdeburg (mäh̲'dē-bu̲rh̲), the capital of Prussian Saxony, and a fortress of the first class, on the Elbe, 76 mi. w.s.w. of Berlin, chiefly on the left bank of the river, which here divides into three arms. The industries are very varied, embracing machinery, castings, armor plates, chemicals, spirits, pottery, sugar, beer, cottons, ribbons, leather, etc. The trade is extensive both by rail and river; for sugar Magdeburg is the chief center in Germany. Magdeburg is a place of great antiquity, being a trading center in the ninth century. It early distinguished itself in the Reformation. During the Thirty Years' War the town was besieged, stormed, and sacked by Tilly, when 20,000 persons are said to have been murdered. Pop. 202,325.

Magellan (Magalhaens), (ma-gel'an, mag'ål-yå-ens), Fernando de (about 1470–1521), a Portuguese navigator, who conducted the first expedition round the world; served under Albuquerque in the East Indies; distinguished himself at the taking of Malacca, in 1511; in 1519 received the command of a fleet of five ships from Charles V of Spain, with which he sailed westward; entered the strait since called after his name, and discovered the Pacific Ocean. Subsequently he was killed in a skirmish with the natives on one of the Philippines.

Magellan, Strait of, separates the continent of South America from Terra del Fuego, 300 mi. long; varies in breadth from 5 to 50 mi., and forms communication between the South Atlantic and South Pacific oceans. The number of obstructing islands makes the channel difficult of navigation. The strait was discovered in 1520 by Fernando Magalhaens.

Magi (mā'jī), the hereditary priests among the Medes and Persians, set apart to manage the sacred rites, and preserve and propagate the sacred traditions, acting also as diviners and astrologers. They possessed great influence both in public and private affairs, conducted the education of the princes, etc. Their order was reformed by Zoroaster. The name came also to be applied to holy men or sages in the East.

Magic, the art or pretended art or practise of producing wonderful effects by the aid of superhuman beings or of departed spirits or the occult powers of nature. The word is used to include a mass of beliefs and practises which bear on matters beyond the ordinary known actions of cause and effect. A large proportion of magical rites are connected with the religious beliefs of those using them, their efficacy being ascribed to supernatural beings. There is, however, a non-spiritual element in magic which depends on certain imagined powers and correspondences in nature, that can be utilized in various ways. In savage countries the native magician is often sorcerer and priest, and sometimes chief of the tribe. Among the ancient Egyptians magic was worked into an elaborate system and ritual, and it was regularly practised among the Babylonians and Assyrians, as well as in Greece and Rome. Alexandria, from the second to the fourth century, became the headquarters of theurgic magic, in which invocations, sacrifices, diagrams, talismans, etc., were systematically employed.

Magic Lantern, a kind of lantern invented by Kircher, a German Jesuit (1604–80), by means of which small pictures or figures magnified to any size at pleasure are represented on the wall of a dark room or on a white sheet. It consists of a closed lantern or box, in which are placed a lamp and a concave mirror, which

reflects the light of the lamp through the small hole of a tube in the side of the lantern, which is made to draw out. At the end of this tube, next to the lamp, is fixed a plano-convex lens and at the other a double-convex lens. Between the two lenses are successively placed various slips of glass, with transparent paintings, representing various subjects, which are thrown in a magnified form on the wall or screen opposite to the lantern and spectators. It has been vastly improved of late, and the substitution of the oxyhydrogen and electric lights for the oil lamp has added much to the effectiveness of its displays; while photography applied to the production of objects has almost indefinitely increased its resources.

Magna Charta Liberta'tum, the Great Charter of Liberties, a document forming part of the English constitution, and regarded as one of the mainstays of English liberty, extorted from King John by the confederated barons in 1215. Its most important articles are those which provide that no freeman shall be taken, or imprisoned, or proceeded against except by the lawful judgment of his peers or by the law of the land; and that no scrutage or aid shall be imposed in the kingdom (except certain feudal dues from tenants of the crown), unless by the common council of the kingdom. The remaining and greater part of the charter is directed against abuses of the king's power as feudal superior. It originally contained sixty-three clauses; subsequent confirmations altered the number of these till 1225 when it took its final and accepted legal form with thirty-seven clauses The most accurate and complete copy of the original charter is that preserved in Lincoln Cathedral. The board of commissioners on the public records ordered a facsimile of it to be engraved, and it has been frequently translated into English.

Magne'sia, a white tasteless earthy substance, possessing alkaline properties, and having a specific gravity of 2.3. It is absorbent, antacid, mildly cathartic, and almost insoluble. It is found native in the state of hydrate and carbonate, and exists as a component part of several minerals. In commerce, pure magnesia is generally distinguished by the term *calcined magnesia*, and is readily obtained by exposing its hydrated carbonate to a red heat. The hydrated carbonate goes by the name of *magnesia* or *magnesia alba*. The chief use of magnesia and its carbonate is in medicine.

Magnesian Limestone, a yellowish rock composed of carbonates of lime and magnesia, the latter amounting in some cases to nearly a half. There are several varieties, more or less useful for building or ornamental purposes, which are included under the generic name dolomite. The same name is also given to the whole Permian formation, from this rock being very largely developed.

Magne'sium, the metallic base of magnesia. It may be obtained by decomposing chloride of magnesium by means of potassium. It is of a white color like silver; its luster is metallic and brilliant; it is very malleable, and fuses at a red heat. Heated to redness in oxygen gas, it burns with brilliancy, and combining with oxygen becomes magnesia, or the oxide of magnesium. The magnesium light is rich in chemical rays, and is now employed to some extent in photography. The chief salts are the carbonate, the chloride, the sulphate (Epsom salt), the phosphates and the silicates, among which are such minerals as chrysolite, meerschaum, soapstone, and serpentine.

Magnetism, the science which treats of the phenomena exhibited by magnets, phenomena due to one of those forces which, like electricity and heat, are known only by their effects. The phenomena of magnetism were first observed in the loadstone or *magnet* (so named from Magnesia in Asia Minor). The loadstone is a kind of iron ore (magnetic iron ore), and is found in many parts of the world, especially in the Scandinavian peninsula and in Siberia. It has the power of attracting small pieces of iron or steel, and when suspended in such a way as to be able to move freely, always points to what are called the magnetic poles of the earth, that is, nearly north and south. A piece of loadstone forms a *natural magnet*, and has the further remarkable power of giving all its own properties to hard iron or steel when these bodies are rubbed by it. A bar or mass of iron or steel to which the peculiar properties of a natural magnet have been imparted by friction from other magnets or by electric *induction* is called an *artificial magnet*. When freely suspended, all magnets, natural and artificial, rest with their lengths in a northerly and southerly direction, and this property is utilized in the compass. They attract iron and other magnetic substances with a force increasing from the middle of the magnet to its extremities, which are called its *poles*. The magnetism at the two poles is different, that pole which points to the north is distinguished as the north or north-seeking pole, or by the sign plus (+); that which points to the south as the south or south-seeking pole, or by the sign minus (—). The poles of the same denomination repel each other, while those of different names have mutual attraction, thus resembling the two electricities, positive and negative. The intensity of this attraction and repulsion varies inversely as the square of the distance, a law which also governs electrified bodies. Magnetism pervades the earth as electricity does the atmosphere. The space in the neighborhood of a magnet is called the *magnetic field;* a piece of soft iron brought into this space becomes magnetic, but it loses its magnetism as rapidly on removal from the field. Steel has *coercive force*, in virtue of which it requires time for magnetization, and retains its magnetism on removal from the field. Hard steel may be made magnetic by rubbing it several times in the same direction with a powerful magnet, and hence it is easy to multiply magnets. The most powerful, permanent magnets are produced by rubbing bars of steel on electro-magnets, or by moving them backward and forward along the axis of a coil of wire in which an electric current is passing. A bar is mag-

netized to saturation when its magnetism is as great as it can retain without future sensible loss. When a magnet is broken into a number of pieces each piece is found to be magnetic, and its north pole is found to have been directed toward the north pole of the unbroken magnet. When these pieces are put together again poles placed in contact nullify each other, and the original magnet is reproduced. At the Stevens Institute of Technology in New York is the strongest magnet in the world. It weighs 1,600 lbs., and has a lifting capacity of from 30 to 50 tons, or from 40 to 70 times its own weight.

Terrestrial Magnetism, which pervades the whole earth, is extremely complicated. It becomes manifest by its influence on the magnetic needle, varying with time and place over the earth. One pole of the needle points toward the north, the other toward the south. There are, however, only two lines on the surface of the earth on which it points directly north and south, and where the magnetic and geographical meridians appear to coincide. Elsewhere the needle deviates more or less from the true north. This is termed the declination of the needle, and varies from place to place, and in the course of time at the same place. When a needle is balanced on a horizontal axis so that it can turn in a vertical plane, the extremity attracted by the nearer magnetic pole of the earth points more or less downward. The angle thus made is called the dip or inclination, and the lines marking equal inclinations on a map are called *isoclinal* lines. They intersect the isogonal lines, and the dip increases toward the perpendicular as the magnetic poles are neared. These magnetic poles do not coincide with the geographical poles, the northern being in 70° 5′ n. and 96° 43′ w. The southern is probably at 73½° s. and 147½° e. There are two foci of maximum force in the northern hemisphere and two in the southern. In the northern hemisphere the stronger focus is assumed to be in 52° n. and 90° w., and the weaker in 70° n. and 115° e. In the southern hemisphere the stronger focus is assumed to be in 65° s. and 140° e., and the weaker probably in 50° s and 130° e. The earth's magnetism is subject to vast unaccountable commotions or storms of immense extent, which occur at irregular intervals and are of short duration. They are often connected with manifestations of electrical phenomena, such as the aurora borealis, or thunder storms. These disturbances are made manifest by irregular motions of the magnetic needle. The various phenomena connected with terrestrial magnetism are now automatically recorded and systematized in the interest of meteorology. The magnetic equator crosses the terrestrial equator in several places, extending alternately on each side, but never deviating more than 12° from it.

Magneto-Electricity treats of the currents of electricity produced in a conductor when its position is changed relatively to a magnetic field, whereas electro-magnetism treats of magnetization produced by currents.

Magneto-Electric Machines.—In magneto-electric machines an electro-magnet of compact form called the armature is caused to rotate near the poles of a powerful fixed magnet, in such a manner that the core of the armature becomes magnetized first in one direction and then in the opposite, by the inductive action of the poles of the fixed magnet. Every change in the magnetization of the core induces a current in the coil wound upon it. Hence currents in alternately opposite directions are excited in this coil, their strength increasing with the speed of rotation. It is now usual in powerful machines of this class to employ electro-magnets as the fixed magnets, and the current which feeds these fixed magnets (called the *field magnets*) is often the current generated by the machine itself. The machines in this case are called dynamo machines. This name was originally confined to machines which thus supply the current for their own field magnets; but it is now applied to any machine in which the field magnets are electro-magnets. Such machines, of which there is an enormous variety, driven by steam engines or other powerful motors, are now almost universally employed when electric currents are required on a large scale, as in electric lighting.

Magnetometer, an instrument employed for observing the magnetic declination, and also for other absolute magnetic measurements. They are of various forms and are usually self-recording.

Magnificat, the song of the Virgin Mary, Luke 1:46–55; so called because it commences with this word in the Latin Vulgate. It is sung throughout the Western Church at vespers or evensong.

Magno'lia, a genus of trees and shrubs, named from *Pierre Magnol*, a French botanist of the seventeenth century. The species, which chiefly inhabit North America, Northern India, China, Japan, and other parts of Asia, are

Magnolia.

trees much admired on account of the elegance of their flowers and foliage, and are in great request in gardens. In their native countries some of them attain great height, and have flowers 10 in. across. The bark of the root of the beaver tree is an important tonic. The umbrella tree has also tonic properties. The

cones of the magnolia in Virginia yield a spirituous liquor, employed there in rheumatic affections.

Magpie, a bird of the crow family. There are several species, two of which belong to America and are found from the arctic regions to California. The common European magpie is about 18 in. in length; the plumage is black and white, the black glossed with green and purple; the bill is stout, and the tail is very long. The magpies continue in pairs throughout the year, and prey on a variety of food, chiefly animal. They are determined robbers of other birds' nests, destroying the eggs and young birds. In captivity they are celebrated for their crafty instincts, their power of imitating words, and their propensity to purloin and secrete glittering articles.

Common Magpie.

Magruder, Gen. James B. (1810–1871), b. in Pennsylvania. He graduated at West Point in 1830, took an active part in the Mexican War, and when the Civil War broke out he joined the Confederate army with the rank of brigadier general. He was made major general in 1861. He took part in the Imperial army in Mexico until the overthrow of Maximilian. He lectured to some extent in the U. S. on Mexico.

Mahâbhâ'rata (literally, the great history of the descendants of Baharata), an ancient Indian epic of about 220,000 lines, divided into eight books, the leading story of which narrates the history of the war between the 100 sons of Dhritarâshtra and their cousins, the five sons of Pându, for the possession of the ancient kingdom of Bharata, which is said to have comprised the greater part of India. The authorship is attributed to Vyâsa, "the arranger," but this simply means that the materials of which the poem consists were at some time or other welded together with a certain order and sequence so as to form one work.

Mahânadi (*ma*-hä'*na*-dē) (or Mahanuddy) **River,** a river in Southern Hindustan which flows through the Central Provinces and Orissa, falling by several mouths into the Bay of Bengal, after a course of 520 mi. It has several large tributaries, and in connection with it is an extensive canal system, capable, when completed, of irrigating an area of 1,600,000 acres. During the rains the river is navigable for 300 mi. from its delta.

Mahanoy City, Schuylkill co., Pa., 10 mi. n.e. of Pottsville. Railroads: Philadelphia & Reading; and Lehigh Valley. Center of an anthracite coal region, the mining and shipping of which forms an important industry. It also has iron works. Pop. 1900, 13,504.

Mahdi (mä'dē) (Arabic, the director or leader) a name assumed by some of the successors of Mohammed, particularly applied to the twelfth imam, the lineal descendant of Mohammed, b. A.D. 868. He mysteriously disappeared, being probably murdered by a rival, and the belief was that he would remain hidden until the "last days," when he would reappear, and at the head of the faithful spread Mohammedanism over the world. Many professed Mahdis have appeared from time to time in Africa as well as Asia, the latest being Mohammed Ahmed, the leader of the Soudanese insurrection (1883–85). He was b. at Dongola in 1843, d. 1885. He studied Mohammedan theology at Khartoum and Berber, and at twenty-five years of age he retired to the island of Aba in the White Nile, where he lived in solitude for fifteen years. At the age of forty he took up the prophetic rôle, and his short victorious career began.

Mahmud I (1696–1754), sultan of Turkey, reigned 1730–50; Mahmud II (1785–1839), sultan of Turkey, placed on the throne by the Janizaries after the murder of his predecessor, 1808. The chief events of his reign are the war with Russia from 1808 to 1812, which cost him Bessarabia and the provinces of Servia, Moldavia, and Wallachia, as settled by the treaty of Bucharest; the war of Greek independence, which ended in the separation of that country, and the destruction of the Turkish fleet at Navarino, 1820–28; the extermination of the Janizaries, 1826; the treaty of Adrianople with the Russians, who were on the point of entering Constantinople, 1829; the independence of Egypt under Mehemet Ali, and the new treaty of Unkiar-Skelessi with the Russians, 1832–33.

Mahog'any, the wood of a lofty and beautiful tree, indigenous to Central America and the West Indies. It grows most abundantly, and attains its greatest development between 10° n. lat. and the Tropic of Cancer. It reaches maturity in about 200 years, and grows to a height of 40 to 50 ft., diameter 6 to 12 ft. The wood is hard, compact, reddish brown, and susceptible of a brilliant polish. It is one of the best and most ornamental woods known, and is of universal use in the making of furniture. It is imported chiefly from Mexico and British Honduras. British Honduras exports an average of 3,000,000 cubic ft. per year. That which is imported from the West Indies is called "Spanish" mahogany, and is most valued.

Mahomet. See *Mohammed.*

Maidenhair, the name given to the *Adiantam Capillus-venĕris,* an elegant fern with a

creeping scaly rhizome, and bipinnate fronds, the leaflets of which are between rhomboidal and wedge-shaped, margined with oblong sori, and more or less deeply lobed. It is found growing on rocks and walls in Britain, and

Maidenhair.

possesses demulcent and mucilaginous properties.

Maid of Norway, MARGARET, the daughter of Eric, king of Norway, and Margaret, the daughter of Alexander III of Scotland. On the death of Alexander she was acknowledged queen of Scotland, and was betrothed to Edward, son of Edward I of England, but d. on her passage to England in 1290.

Maid of Orleans. See *Joan of Arc.*

Maidstone, a municipal and parliamentary borough of England, county of Kent, 32 mi. s.s.e. from London, on the banks of the Medway, here crossed by a handsome bridge completed in 1879. Paper is largely manufactured in the vicinity, and an extensive trade is carried on in fruit and hops. Pop. 3,150.

Maimansingh, a British district in the Dacca division, Bengal; area 6,287 sq. mi. It is for the most part level and open, and is well cultivated. Rice and jute are among the chief agricultural products. The Jumna and the Brahmaputra are the chief rivers, and the administrative headquarters are at Nasirabad. Pop. 3,051,966.

Maimonides (mī-mon'i-dēz), properly *Moses Ben Maimon Ben Joseph* (about 1131–39–about 1201–9), Jewish scholar, b. at Cordova. Driven from Spain by persecution, he ultimately settled at Old Cairo, where he attained the highest place in the estimation of his co-religionists, became physician to the sultan of Egypt, and superintendent of the Jewish communions. He systematized the whole mass of Jewish tradition, and demonstrated the principles on which Judaism is based. His books were widely circulated in Europe by means of Latin translations. His best writings in Arabic are the *Guide of the Erring*, an exposition of Judaism; a *Compendium of Logic;* a *Commentary on the Mishna;* an *Exposition of the 613 Laws of Moses*, etc. He wrote in Hebrew a complete system of the Talmudic Judaism.

Main (Mīn), a river of Germany, which rises in the Fichtelgebirge, flows in a general westerly direction for a distance of 300 mi., and joins the Rhine a little above the town of Mainz. It is navigable for about 200 mi., and has recently been improved so as to admit the largest Rhine steamers to Frankfort. By means of King Ludwig's canal it affords through navigation to the Danube.

Maine, the northeasternmost state in the Union, is bounded on the e. and n. by the province of New Brunswick; on the n.w. by Quebec, on the w. by New Hampshire; and on the s. by the Atlantic Ocean. Its extreme length is 302 mi. and its breadth is 285 mi., with a total area of 33,040 sq. mi. Its coast line measured direct is 225 mi. in extent, but its indentations give it an actual tide water line of ten times that length. The broken coast line furnishes a multitude of fine harbors, of which those of Portland and Wicasset are the chief. The land slopes from west to east, its elevation being 2,000 ft. in the White Mountain region, although Mt. Katahdin rises to a height of 5,385 ft. The principal rivers are the Saco, Androscoggin, Kenebec, Penobscot, and St. John, all of which rise at great elevations and afford magnificent water power. The state contains 1,600 lakes with an aggregate area of 2,300 sq. mi.

Climate.—The climate is severe in winter and the air dry and pure. The average summer heat is 62 degrees. The mean temperature at Portland is 48 degrees. The cool climate and the opportunities for shooting and fishing make this state a favorite region for summer resort. The winter climate is severe, and the winters are long and the snow deep. The rainfall is copious. The soil is well drained, and malaria is almost unknown, but phthisis is common, and deaths from this cause represent one fourth of the entire mortality.

Vegetation.—The forests of Maine consist principally of pine, hemlock, spruce, and fir, and form an important economic feature. The leading crops are hay, potatoes, apples, and the ordinary grains and small fruits. Agriculture is the chief occupation of the people. The sweet varieties of maize (sugar corn) are extensively cultivated, and are sold largely in tins and glass for winter consumption; this is a prominent industry in some sections.

Mining.—Granite is very extensively quarried, and presents many handsome varieties. Excellent lime is largely produced. Traces of coal are found at Georgetown and Bucksport, and there are local beds of valuable graphite. Many silver mines have been opened, and a few are still operated; but the ores are often expensive to work. Vast beds of copper exist, some of them quite rich. Feldspar, flagstone, limonite, mica, yellow ochre, glass sand, slate, lead ores, talc, tripoli, and manganese are all wrought to a greater or less extent. Tourmaline is obtained as a precious stone, for jewelers' use; and lepidolite, a mineral rich in the rare metal cæsium, is found in considerable abundance.

Fisheries.—The coast waters abound in fish, and her fisheries are among Maine's most im-

portant industries. Large quantities of cod, herring, mackerel and other food fish are taken. The lobster catch is also important, and the taking of oil fish, particularly menhaden, used in supplying both oil and fertilizer, is a valuable commercial industry. The streams and lakes abound in pickerel, salmon and trout. The canning of sardines also gives employment to a large number of people.

Manufactures.—The numerous rivers and lakes furnish abundant water power for manufacturing. It is estimated by good authorities that the combined power of these rivers exceeds 2,000,000 horse-power. Much of this is already employed, and all will be in use within a few years. According to the census of 1900, the state contains 8,356 manufacturing establishments, giving employment to an average of 75,675 wage earners and producing an annual output valued at $128,617,181. The leading industries in the order of their importance are the manufacture of cotton goods, paper and wood pulp, lumber and timber products, woolen goods and fish canning and preserving. Other industries worthy of mention are the manufacture of flour and gristmill products, ship building and printing and publishing. Maine was formerly first in shipbuilding, but since steel has replaced wood for this purpose the industry has greatly declined.

Transportation.—The irregular coast furnishes numerous good harbors. The Kennebec, Androscoggin and Penobscot are navigable in the lower part of their courses. The state is fairly well supplied with railways, the total mileage being about 2,000. The various lines are controlled by one of the following systems: Canadian Pacific, Maine Central, Boston & Maine and Grand Trunk. Electrical railways are found in all the larger cities and towns, and the lines are being extended each year.

Education.—An excellent system of public schools is maintained and every town is required to raise and expend each year not less than eighty cents per inhabitant, this sum to be supplemented by the income from a permanent school fund and by a state tax. The total annual income for school purposes exceeds $1,500,000. Children between the ages of nine and fifteen years are required to attend school at least twelve weeks each year. State normal schools are maintained at Farmington, Castine, Gorham, Springfield and Port Kent. Owing to the establishment of free high schools, the number of academies and seminaries has decreased since 1890. The State Agricultural College is at Orono. The other leading colleges are Bowdoin, at Brunswick; Colby University, at Waterville; Bates College, at Lewiston, and the Medical School of Maine, at Brunswick. A reform school for boys is maintained at Cape Elizabeth, and an industrial school for girls at Hallowell. The state's prison at Thomasville also gives convicts instruction in the common English branches and in bookkeeping. The state asylum for the insane is at Augusta.

History—Maine was probably first visited by the Northmen about 1000 A. D. The Cabots sailed along the coast in 1497 and 1498, and in 1524 Verrazani named the whole coast New France. The region was successively granted to French and English settlers by their respective governments, but these early grants were not permanent. The first English settlement was that of the Popham Colony, at the mouth of the Kennebec, in 1607. In the winter of 1608 these settlers built the first ship constructed in America. The settlement was abandoned in the spring. In 1632, the New England Council granted the land between the Merrimac and Kennebec rivers to Sir Fernando Gorges and George Mason, and the region was henceforth known as Maine. Gorges established his capital at York in 1639. This was the first chartered city in America. In 1677, Massachusetts bought the title of Gorges from his heirs, and in 1691, a new charter merged all the provinces from Plymouth to Acadia in the Province of Massachusetts Bay. For the next 120 years Maine was a province of Massachusetts. It was admitted to the Union in 1820. During the French and Indian War the settlements suffered much from Indian depredations, but the colony furnished its quota of men. Maine took a prominent part in the American Revolution, the genius of her shipbuilders contributed much to the success of the American navy in the War of 1812, and during the Civil War she furnished 70,107 men for the Union army. Since 1890 the population and industries have steadily increased, and the extensive resources of the state are such as to give it a prominent place in the Union. The principal cities are Augusta, the capital, population 11,658; Portland, 50,145; Lewiston, 23,761; Bangor, 21,850; Biddeford, 16,145; Auburn, 12,951; Waterville, 9,477; Rockland, 8,150, and Calais, 7,655. Popular name, *Pine Tree State.* Pop. 1900, 694,466.

Maine, Sir Henry James Sumner, LL.D., F. R. S. (1822-1888), English jurist. His chief works are *Ancient Law in Connection with the Early History of Society, and its Relation to Modern Ideas; Village Communities in the East and West; The Early History of Institutions; Dissertations on Early Law and Custom; the Whewell Lectures on International Law,* delivered before the University of Cambridge, 1887; etc.

Maine et Loire (mān-e-lwär), a western department of France; area 2,750 sq. mi. It has a gently undulating surface, the slopes of which are generally covered with vines, while the plains are of great fertility. Some of the white wines produced are much esteemed. Pop. 527,680.

Maintenon (maṇ-tē-nōn), Françoise D' Aubigné Marchioness de (1635-1719), wife of Louis XIV, and granddaughter of Henry the Fourth's friend, Theodore Agrippa D'Aubigné. Left quite destitute in her tenth year, Mademoiselle D'Aubigné spent her youth in dependence on her rich relatives, and was glad to contract a nominal marriage with the fa-

mous wit Scarron, a deformed, old, and infirm man. Her beauty, liveliness, and propriety of conduct gained for her powerful friends among those who frequented her husband's house; and on Scarron's death she was intrusted with the charge of the children born to Louis XIV by Madame de Montespan. She assumed this office in 1669, and played her cards so dexterously that the king married her privately, probably in 1685, when her age was fifty and his own forty-seven. For the remaining years of his life she was his most confidential adviser. It was at her instigation that the Edict of Nantes was revoked and the Protestants persecuted. She d. at the nunnery or school of St. Cyr, which she herself had founded.

Mainz (mīnts; English, *Mentz;* French, *Mayence*), a fortified town of Germany, in the grand-duchy of Hesse, finely situated on the left bank of the Rhine, opposite the mouth of the Main, 20 mi, w.s.w. Frankfort. The older part of the town has been mostly modernized since the destruction caused by a powder-magazine explosion in 1857, and an extensive new quarter has been added since the recent widening of the fortified circuit. The city contains a fine statue of Gutenberg by Thorwaldsen. The manufactures embrace leather, furniture, hardware, carriages, tobacco, beer, chemicals, musical instruments, etc. The trade, particularly transit, is extensive. Mainz was for long the first ecclesiastical city of the German Empire, of which its archbishop-elector ranked as the premier prince. Its history during the sixteenth century is of considerable interest in connection with the progress of the Reformation. Pop. 72,059.

Maire, Le, Straits of, a channel between Terra del Fuego and Staten Island, named from a Dutch pilot who discovered it in 1616.

Maitland, William (about 1525–1573), commonly known as Secretary Lethington, a Scottish statesman, eldest son of Sir Richard Maitland. In 1560 he was speaker of the Parliament which abolished the authority of the pope in Scotland. On Queen Mary's arrival in Scotland he was chosen one of her principal ministers, and was continually employed as her envoy to the English court. The regent Moray, suspecting him of being at the bottom of the intrigues in favor of Mary both in England and Scotland, had him arrested in 1569 as an accessory to Darnley's murder. He was set at liberty by Kirkcaldy of Grange, and after the assassination of Moray he became the life and soul of the queen's party, and kept up an active correspondence with Mary. In 1571 he joined Kirkcaldy in Edinburgh Castle, was proclaimed a traitor by the Parliament, and attainted with his two brothers. On the surrender of Edinburgh Castle, Kirkcaldy and his brother were hanged, but Maitland died in prison in Leith, presumably by his own hand.

Maize. See *Corn.*

Majesty, a title belonging to kings and queens. In England Henry VIII first adopted the title, and at present all emperors and kings are addressed as "your majesty." The former kings of France were addressed as "most Christian majesty," the kings of Spain as "most Catholic majesty," the kings of Portugal as "most faithful majesty," the kings of Hungary as "apostolic majesty." The emperors of Germany and Austro-Hungary have the title of "imperial royal majesty."

Major, in the army, is a field officer next in rank above a captain and below a lieutenant colonel. His duties are to superintend the exercises of the regiment or battalion, to carry out the orders of his superior officers, and to command in the absence of the lieutenant colonel.

Major, in music, designates in general a larger in contradistinction to a smaller interval of the same denomination, called a *minor* interval; thus a *major tone* is the interval between two tones having the proportion to each other in number of vibrations of 8:9; a *minor tone* the interval between two tones in the ratio of 9:10; a major third is an interval of two tones (major and minor); a minor third an interval of a tone and semitone. The *major mode* is one of the two recognized modern modes (or forms of the scale), in which the first third in the scale is a major third, in contradistinction to the *minor mode*, in which the first third is a minor third.

Major'ca (Spanish, *Mallorca*), an island in the Mediterranean belonging to Spain, the largest of the Balearic group, between Iviça and Minorca; greatest length, 58 mi.; greatest breadth, 45 mi.; area 1,420 sq. mi. It is very irregular in shape, and deeply indented. The coasts on the west and north, facing Spain, are lofty and steep; in other directions, and particularly on the east, they are low and shelving. The island is generally fertile, producing, besides large crops of cereals, hemp, flax, silk, and saffron. Fruits abound; the pastures are rich, and maintain large numbers of cattle; and the fisheries on the coasts are valuable. It is traversed by several railways. Chief town, Palma. Pop. 230,396.

Majority, in law, is the period of full age, at which the laws of a country permit a young person to manage his own affairs. In the U. S., as well as in most other countries, the age of majority is twenty-one years.

Makart, Hans (1840–1884), German painter, b. at Salzburg. He studied at Vienna and Munich, and latterly settled at Vienna. He was a great colorist, but was deficient in conception and drawing. Among his chief works are: *A Trilogy of Modern Amorrettes; The Seven Deadly Sins; The Dream of a Man of Pleasure; The Gifts of Sea and Earth; Leda;* and *The Entrance of Charles V. into Antwerp.*

Maki, a name applied to some of the lemurs.

Mako (or Makovia), a town of Hungary, on the right bank of the Maros, 22 mi. e. by s. of Szegedin. Pop. 30,063.

Makolo'lo, a large and once powerful tribe in South Africa, between lat. 13° and 20° s. They attained considerable eminence during Livingstone's time, but shortly after 1864 the kingdom was broken up.

Makri'zi, Abu Ahmad Mohammed, Al

(1360–1442), Arabic writer. He wrote a *Historical and Topographical Description of Egypt*, a *History of Saladin*, a *Treatise on Moslem coins*, etc.

Malabar', a maritime district of British India, in the presidency of Madras, on the west coast; area 5,765 sq. mi.; length 145 mi.; breadth varying from 25 mi. on the n. to 70 mi. on the s. Tea and coffee plantations have been successfully established. The principal towns are Cananor, Tellicherry, and Calicut. Pop. 2,365,035. The name Malabar is often applied to the whole extent of coast country as far north as Bombay.

Malac'ca, a territory and town forming part of the British colony of the Straits Settlements, on the west coast of the Malay Peninsula, on the Strait of Malacca. It extends about 40 mi. along the shore of the strait, and about 25 mi. inland. Area 875 sq. mi. Tapioca and rice are the chief products. The district contains deposits of gold and tin. The town is one of the oldest European settlements in the East, being founded by the Portuguese in 1509. It was acquired from the Dutch in 1825. Its trade and importance are now slight. Pop. of town 15,000; of the district 93,579, of whom 67,513 are Malays and 19,741 Chinese.

Malacca, STRAIT OF, the channel between the Malay Peninsula and the Island of Sumatra, extending from latitude 1° to about 6° n. Entire length about 520 mi.; breadth varying from 25 mi. to 200 mi.

Malacca Cane, a cane made from the wing-leaved, erect, slender, cane-stemmed palm which, when dressed, is of a brown color, sometimes mottled or clouded. It is brought from Singapore and Malacca, but is chiefly produced in Sumatra.

Malachite (mal'a-kīt), a carbonate of copper, of a dark emerald-green color, and of a laminated, fibrous, or massive structure. The finest specimens are obtained from Siberia, but it is found in many places all over the world. Fibrous malachite, when finely pulverized, is used as a paint; massive malachite is made into boxes, knife-handles, table-slabs, and other ornamental articles, and is susceptible of a beautiful polish. Blue malachite or azurite contains a larger proportion of carbonic acid.

Mal'aga, a seaport of Southern Spain, in Andalusia, capital of a province of the same name, on the Mediterranean. It was anciently called *Malaca;* was a flourishing city under the Romans, and its long occupation by the Moors has left distinct marks in the older parts of the town. The manufactures consist chiefly of iron, the ore of which is obtained from rich mines in the vicinity; soap, cottons, linens, machinery, etc. The trade is of much more importance, the principal exports being olive oil, lead in bars, wine, and fruit, particularly raisins, oranges, and almonds. The climate is one of the mildest and most equal in Europe. Pop. 134,016. The province of Malaga has an area of 2,822 sq. mi.; pop. 518,114. It is traversed in all directions by offsets of the Sierra Nevada. The valleys are fertile and generally well cultivated, yielding cereals, grapes, oranges, lemons, figs, almonds, sugar cane, etc.

Mala'ria, air tainted by miasmata or deleterious emanations from animal or vegetable matter, especially the exhalations of marshy districts which produce fevers. A class of diseases, among which intermittent and remittent fevers occupy a prominent place, have been known from a very early period to be especially prevalent in marshy districts, where they are promoted at particular seasons by certain conditions of heat and moisture. The noxious agents by which these results are produced are known to be the product of vegetable decomposition. The decomposition of animal tissues gives rise to similar miasmata, by which such diseases are often promoted in towns, and cholera has been traced to a similar origin. The vegetable miasmata productive of malaria are most abundant in the deltas and on the banks of tropical rivers. Among the districts of Europe infected with malaria the Campagna di Roma is by far the most celebrated.

Malay Archipelago, also known as the Indian, Asiatic, or Eastern, the great group of islands situated to the southeast of Asia, and washed on the west by the Indian, and east by the Pacific Ocean. The archipelago may roughly be said to lie between the meridians of 95° and 135° e., and the parallels of 11° s. and 17° n. Within these limits lie some of the largest and finest islands in the world, as Borneo, Sumatra, Java, Celebes, the Philippines, etc., but New Guinea is not ranked as belonging to the group. The chief of the smaller islands are the Moluccas, or Spice Islands, Billiton, Banca, Madura, Bali, Lombok, Sumbawa, Flores, Timor. The small islands may be truly called innumerable. The islands are generally fertile, and covered with a luxuriant vegetation, and they produce all kinds of tropical products in abundance. Many of them contain volcanoes. The chief native race is the Malayan. A large portion of the archipelago is really, or nominally, under the sway of Holland, and this portion is frequently called the Dutch East Indies.

Malay Peninsula, the most southern part of continental Asia, the long, narrow projection that stretches first south, and then southeast from Siam and Burmah. It is connected with Lower Siam by the Isthmus of Kra, has on the east the Gulf of Siam and the China Sea, and on the west the Strait of Malacca. It varies in width from 45 mi. at the north to about 210 mi. The area is about 70,000 sq. mi., and the pop. is variously estimated at from 650,000 to 1,000,000, including large numbers of Chinese. The country is mountainous, with peaks of from 5,000 to 9,000 ft. high; it is densely wooded; rivers numerous but short; minerals important, more especially tin, which is found in great quantity and largely exported. Politically the peninsula, excepting the British territories of Penang and Malacca, is divided among a number of more or less independent chiefs tributary to or in treaty with Siam and Britain. The native races are Siamese, Malays, and Negritos.

Malays, the name of a race of people inhabiting the Malay Peninsula, and spread over all the Asiatic Archipelago. They claim to have had their native country in the highlands of Sumatra, where they established the once powerful state of Menangkabo, now subject to the Dutch. In physical appearance they are rather under the middle height, light brown in color, with black, straight hair, high cheek-bones, black, and slightly oblique eyes, and scanty or no beard. The civilized Malays profess the Mohammedan religion. They are said to be of a taciturn, undemonstrative disposition, naturally indolent, treacherous in their alliances, and addicted to piracy. When under excitement or passion they are often seized with the "amok" fever, when they indiscriminately cut down with great ferocity every one they meet. The Malay language is agglutinative in character, and is very extensively used as that of literature and commerce.

Malcolm (mål'kom) **I,** king of Scotland, reigned from 943 to 954. MALCOLM II succeeded Kenneth II in 1005. In his reign Lothian and Strathclyde became parts of the Scottish kingdom. He was assassinated at Glamis in 1034. He was the last direct male descendant of Kenneth MacAlpine. MALCOLM III (1024–), surnamed *Canmore* (Great Head), After the murder of his father, Duncan, by Macbeth, he sought aid from Siward of Northumbria, and his cause was also espoused by Edward the Confessor. On the defeat and death of Macbeth he was crowned at Scone in 1058. His reign, which was mostly taken up with wars with England, had nevertheless an important bearing on the civilization and consolidation of Scotland. MALCOLM IV (the Maiden) succeeded his grandfather, David I, in 1153. He surrendered Northumberland and Cumberland to Henry II in 1157. Died at Jedburgh in 1165, at the age of twenty-four.

Malden, Middlesex co., Mass., 5 mi. n. of Boston. Railroad, Boston & Maine. Industries: sand and emery paper, cords and tassels. Rubber-shoe manufacture is also extensively carried on, one of the largest manufactories in the country being located here. It also contains large boot and shoe factories. Population 1900, 33,664.

Mal'dive Islands, a remarkable chain of islands in the Indian Ocean, extending from lat. 0° 40′ s. to 7° 6′ n., nearly on the meridian of 73° 30′ e., and composed of seventeen clusters of atolls. The larger islands are richly clothed with wood, chiefly palm, and are fertile in fruit and in various kinds of edible roots; they also produce millet, and abound in cocoanuts, fowls, and all descriptions of fish. The inhabitants carry on a considerable trade with Bengal, Ceylon, and the Malabar coast, extending also to the Red Sea and to Sumatra. They are governed by a sultan, who resides in the island of Male or Mohl, and pays annual tribute to the British government in Ceylon. Pop. 150,000 to 200,000.

Malibran (mȧ-lē-brän), MARIA FELICITA (1808–1836), one of the greatest singers of modern times, b. at Paris, was daughter of a well-known singer and singing master, Manuel Garcia. She made her début in 1825 at the opera in London, and the following year went to New York, where she married M. Malibran, a French banker, from whom she soon separated. She returned to Europe, where her splendid vocal powers and dramatic ability made her an extraordinary favorite in Britain and on the Continent. Having obtained a divorce from her first husband, she married the violinist De Bériot.

Malice, in law, a formed design or intention of doing mischief to another, called also *malice prepense* or *aforethought.* It is *express* when the formed design is evidenced by certain circumstances discovering such intention; and *implied* when the act is done in such a deliberate manner that the law presumes malice, though no particular enmity can be proved. *Malicious mischief* is the committing of an injury to public or private property from sheer wantonness or malice. This offense is punishable with great severity. Intent is the material ingredient in offenses of this nature; but as the law presumes malice in the very commission of the act, it lies on the party indicted to rebut the presumption of malice, or sufficiently explain the act. A *malicious prosecution* is a prosecution brought against a person maliciously and without reasonable cause. From the mere want of probable cause malice may be inferred.

Mallock, WILLIAM HURRELL (1849–), b. in Devonshire, his mother being a sister of Froude, the historian; was educated privately and at Baliol College, Oxford, where he gained the Newdigate for a poem on the *Isthmus of Suez.* He is a frequent writer on political and social subjects in the magazines, and has published *The New Republic; The New Paul and Virginia; Is Life Worth Living? A Romance of the Nineteenth Century; The Old Order Changes,* a novel; etc.

Mallow (*Malva*), a genus of plants of the natural order Malvaceæ. The common mallow is a common and widely diffused species, possessed of mucilaginous properties. The whole plant is used officinally in fomentations, cataplasms, and emollient enemas. When fresh the flowers are reddish purple, but on drying become blue, and yield their coloring principle both to water and alcohol. The alcoholic tincture furnishes one of the most delicate of re-agents for testing the presence of alkalies or acids. The dwarf mallow is also a native of Britain. Its stems are short, simple, spreading widely around, rising from a long, deeply buried root. Its leaves are of a handsome, round, heart-shaped form, somewhat lobed and crenate on their edges; the flowers white, violet-white, or purplish. The musk mallow has handsome, deeply cut leaves, which diffuse a pleasant, musky odor, and large rose-colored flowers. The fiber is sufficiently tenacious to be used in making cordage. Mallow is naturalized in the U. S.

Malmesbury, JAMES HARRIS (1746–1820), EARL OF, son of James Harris, the author of *Hermes.* His diplomatic career, dating from 1768, was a brilliant success, and earned him

the reward of an earldom in 1800. His *Diaries and Correspondence* were published in 1844, his *Letters* in 1870.

Malmö (mål'meu), a seaport of Sweden, capital of the laen or prefecture of Malmöhus, situated on the eastern shore of the Sound opposite Copenhagen. The manufactures and other industries are considerable, and the shipping trade of the port is large. Pop. 45,143. The laen of Malmöhus is very fertile; has an area of 1,781 sq. mi.; pop. 364,543.

Malmsey Wine, is a sweet wine obtained from a grape originally brought from Malvasia or Malvoisie in the Morea. It is made in the Azores, the Lipari Islands, Teneriffe, Sardinia, Sicily, but more especially in Madeira, from grapes that have been allowed to shrivel on the vine.

Malone', EDMUND (1741–1812), a commentator and editor of *Shakespeare,* was b. at Dublin. He was called to the London bar in 1767, but devoted himself entirely to literary pursuits. He published an edition of Shakespeare with suggestive notes in 1790; *Remarks on the Rowley (Chatterton) Controversy;* an *Inquiry into the Ireland Shakespearian Forgeries;* biographical memoirs of Sir Joshua Reynolds, Dryden, W. Gerard Hamilton, etc.

Malpighia (mal-pig'i-a), a genus of plants named after Marcello Malpighi. The species are small trees or shrubs, with opposite shortly stalked leaves, an axillary, and terminal fascicles or corymbs of white or red flowers. The fruit of one species is the Barbadoes cherry of the West Indies.

Malt, grain, usually barley, steeped in water and made to germinate, the starch of the grain being thus converted into saccharine matter, after which it is dried in a kiln, and then used in the brewing of porter, ale, or beer, and in whisky distilling. One hundred parts of barley yield about ninety-two parts of air-dried malt.

Malta (anciently *Melita*), an island in the Mediterranean belonging to Britain, 62 mi. s.s.w. of Sicily, and 197 mi. n. of Africa; area 98 sq. mi., to which the adjoining islands of Gozo and Comino add 24. The most important indentation is the double bay on which the capital, Valetta, an important naval station, stands. The greatest elevation of the island is about 750 ft. There are only a few small streams, but the springs are so numerous and copious that no deficiency of water is felt. Corn, cotton, potatoes, and clover are the chief crops. Both the vine and olive are cultivated, and fruit, particularly figs and oranges, is very abundant. The manufactures consist of cotton goods, lace, jewelry, etc. The climate is very hot in summer, but pleasant and healthy in winter, attracting many visitors at this season. It was taken from the French by the British in 1800, and finally annexed by them in 1814. By a new constitution adopted in 1888 the legislative council consists of the governor and the members of council (6), with 14 members elected by the constituencies into which Malta and the islands of Gozo and Comino have been divided. The people are mainly of Arabic race and speak a kind of Arabic mixed with Italian. Italian and English are also spoken. The educational institutions include a university, a lyceum, two secondary schools, besides primary and infant schools. Beside the capital Valetta and the three cities adjoining there are several considerable towns or villages. The total population, inclusive of the garrison (about 5,000), is 160,679.

Malthus, REV. THOMAS ROBERT (1766–1834), English political economist. In 1805 he was appointed professor of history and political economy in the East India Company's College at Haileybury, an office which he held till his death. In 1798 he first published the views with which his name is associated in his *Essay on the Principles of Population as it Affects the Future Improvement of Society.* It was improved and matured in subsequent editions. His leading principle is that population, when unchecked, goes on increasing in a higher ratio than the means of subsistence can under the most favorable circumstances be made to increase; that the great natural checks to excessive increase of population are vice, misery, and moral restraint; and the great business of the enlightened legislator is to diminish the first two and give every encouragement to the last. Besides the *Essay* Malthus wrote various pamphlets and works of temporary interest.

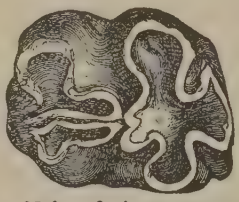
Malva'ceæ, the mallows, a large natural order of exogenous plants. A large proportion of the order consists of herbaceous or annual plants, inhabiting all the milder parts of the world, but found most plentifully in hot countries. Several species are of essential service to man. As emollients they are well known in medical practise. The hairy covering of the seeds of the various species of *Gossypium* forms raw cotton. The inner bark of many species yields fiber of considerable value. Many species are splendid flowering plants.

Mam'elukes (or Mamalukes) (Arabic, "slaves"), the former mounted soldiery of Egypt, consisting originally of Cicassian slaves. As early as 1254 they became so powerful that they made one of their own number sultan, this dynasty continuing till 1517, when it was overthrown by Selim I. They still continued to be virtual masters of the country, however. They suffered severely in opposing the French at the end of the eighteenth century, and in 1811 Mehemet Ali caused a general massacre of them throughout Egypt.

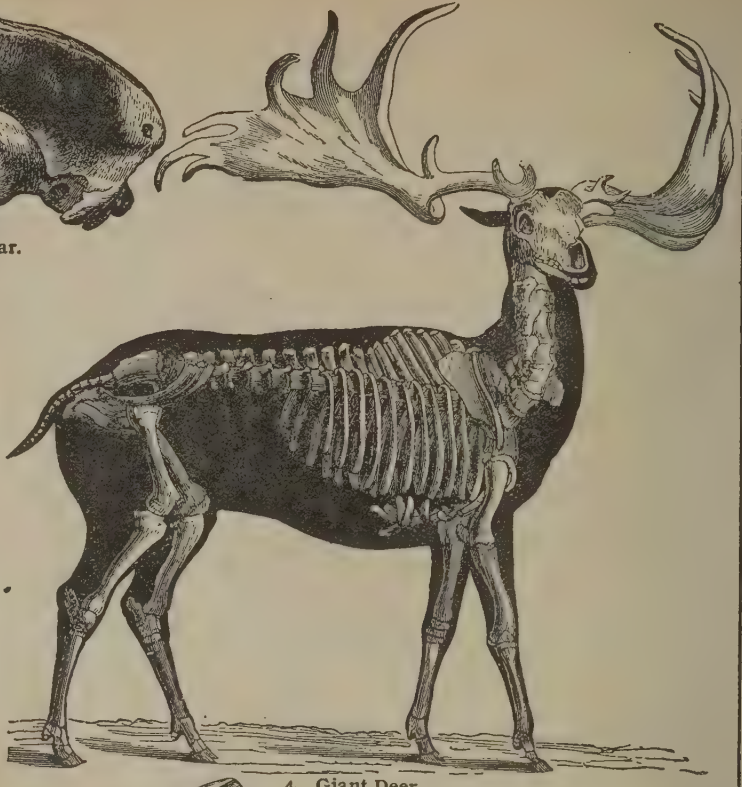
Mamma'lia, the highest class at once of the Vertebrata and of the animal kingdom, including those warm-blooded animals we familiarly term "quadrupeds," the whales and other fish-like forms, and man himself. Their distinctive characteristic is that the female suckles the young on a secretion peculiar to the class, furnished by the mammary glands of the mother, and known as milk. The skin is always more or less covered with hairs, which are found in many forms, from the finest wool or silky down to large coarse bristles and even spines. The skeleton exhibits a uniformity of essential structure, and in most points agrees

1. Scull of a Cave-Bear.

2. Molar of Rhinoceros.

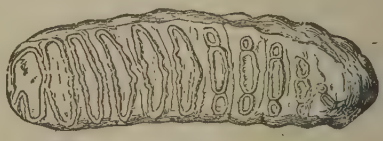


3. Molar of Hippopotamus.

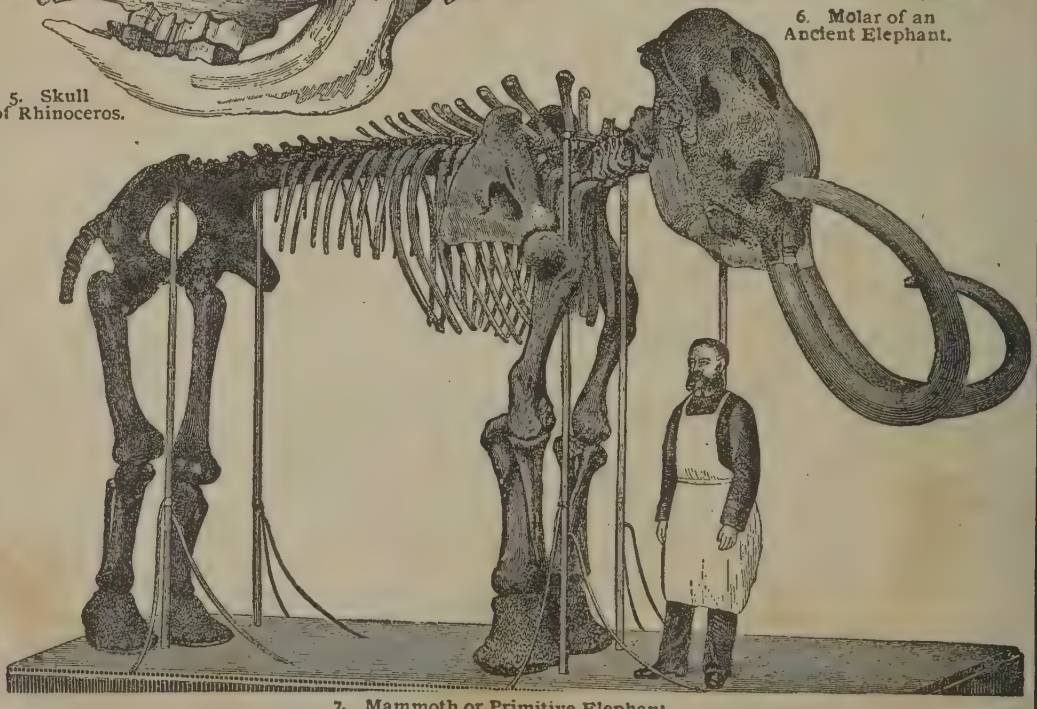


4. Giant Deer.

5. Skull of Rhinoceros.

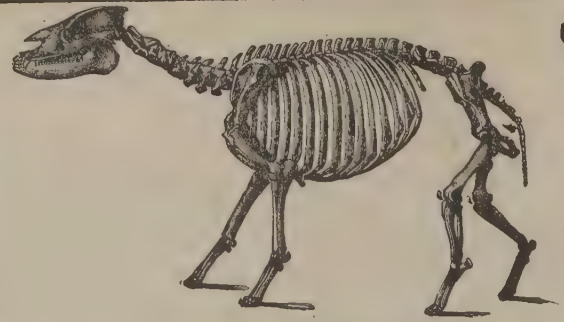


6. Molar of an Ancient Elephant.

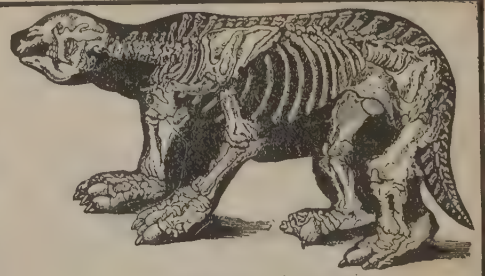


7. Mammoth or Primitive Elephant.

Mammoth (1-96).



Mylodon.



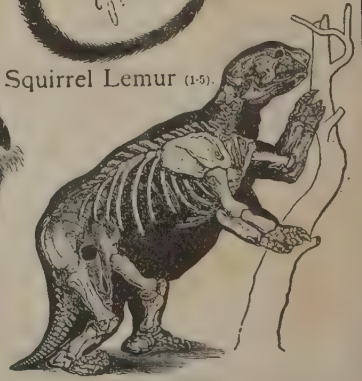
Megatherium (1-60).

European otter (1-14).

Squirrel Lemur (1-5).

Chimpanzee (1-3).

Walrus (1-60).



Paleotherium.

with that of man. The cavity of the thorax or chest is bounded by the ribs, which vary greatly in number, but generally correspond to that of the dorsal vertebræ. The skull forms a single piece composed of bones immovably fastened together, to which is articulated the lower jaw, composed of two halves united at the chin. The skull is joined to the spine by means of two condyles which fit into the first cervical vertebra. The limbs, like those of all other Vertebrata, are never more than four. The front limbs are invariably present, but in cetaceans and such allied forms as the dugongs and manatees the hinder limbs are either completely suppressed or present only in a rudimentary state. The limbs are generally well developed, and are most commonly adapted for terrestrial progression; some are suited for burrowing, others for climbing, those of the cetaceans and seals for swimming, while some (the bats) have the fore limbs developed into a kind of wing. Teeth are present in most mammals; but they are only represented in the embryo in the whalebone whales, and are entirely absent in the ant-eater, pangolin, and echidna. The teeth are lodged in sockets, and are not ossified to the jaw-bones as in lower forms. Mammals which have only a single set of teeth, throughout life are termed *monophydont;* those who have the first set of teeth (milk or deciduous teeth) replaced by a second set of permanent teeth are called *diphyodont.* The chest or thorax in all mammals is separated from the abdominal cavity by a complete *diaphragm* or "midriff," which thus constitutes a great muscular partition between these cavities, and also forms the most important agent in effecting the movements of the chest during respiration Within the thorax the heart and lungs are contained, while the abdomen and its lesser pelvic cavity contain the organs relating generally to digestion, excretion, and reproduction The stomach, generally simple, may, as in some monkeys, in the kangaroos, in the pig, and most of all in the ruminants, exhibit a division into compartments. A liver and pancreas are present in all Mammalia. The lungs agree in essential structure with those of man, as also does the heart with its four chambers—right and left oricles and right and left ventricles. The red corpuscles of the blood are circular in shape except in the case of the camels. All mammals with the exception of the monotremes are viviparous, but there are considerable differences in the relations subsisting between mother and young before birth, thusleading to t he division into placental and aplacental mammals. Man and all other mammals, except the monotremes and marsupials, belong to the latter division. All mammals possess mammary or milk glands, which, however, may differ chiefly in number and position throughout the class. In the *classification* of this important group authorities differ somewhat, but the mammals may be divided into the following groups: Man; Apes and Monkeys; the Prosimians or Lemurs; the Bats; the Insect-eaters; the Flesh-eaters; the Seals; the Whales and Dolphins; the Sea-cows; the Elephants; the Odd-toed Ungulates; the Even-toed Ungulates; the Gnawers or Rodents; the Edentates; the Marsupials, or Pouch-bearing Mammals; and the Monotremes.

Mammary Glands, the milk-producing organs, the distinctive mark of the mammals. These structures present in man an essentially *lobular* structure. The lobes are divisible into smaller *lobules,* which consist ultimately of groups of vesicles which open into minute ducts converging into larger channels which lead to the milk reservoirs at the nipple. The nipple itself is composed of unstriped muscular fibers and areolar tissue. It also possesses erectile powers, and blood-vessels are in consequence freely distributed to it. These glands, save in exceptional instances, are undeveloped in the male. They are always in pairs on some part of the ventral surface of the body, but in number and position they vary much in various groups.

Mammee′ Tree (or West India Apricot), a tall handsome tree bearing a fruit about the size of a cocoanut. This has two rinds enclosing the pulp, which is firm, bright yellow, and has a pleasant taste and smell. The seeds, which are large, are used as anthelmintics, and a gum distilled from the bark is used to destroy chigoes.

Mammon, a Syriac word used in St. Matthew as a personation of riches or worldliness. There does not appear to have been any idol in the East receiving divine honors under this name.

Mammoth, a species of extinct elephant, the fossil remains of which are found in European, Asiatic and North American formations. Geologically speaking, the mammoth dates from the Post-Pliocene period. It survived the

Mammoth.

Glacial period, and lived into the earlier portion of the human period; its remains having been frequently found associated with human remains, and its figure carved on bone. It appears to have been widely distributed over the northern hemisphere, but never south of a line drawn through the Pyrenees, the Alps, the northern shores of the Caspian, Lake Baikal, Kamtchatka, and the Stanovol mountains. It had large curved tusks, and shaggy hair. The bones and tusks have been found in great abundance in Siberia; and an entire carcass

which had been preserved in the ice and latterly thawed out was discovered toward the close of last century on the banks of the river Lena, in such a perfect state that the flesh was eaten by dogs, wolves, and bears. Its skin was perfectly preserved, and was seen to be clothed with a furry wool of reddish color, interspersed with black hairs. The skeleton and other parts of this animal are preserved in the St. Petersburg Royal Museum. It must have been twice as bulky as the elephants at present living

Mammoth Cave, a stupendous cave in Kentucky, near Green River, about 80 mi. s.s.w. of Louisville. It is one of a large series of vast caverns here formed in the limestone rock, and which are found over an area of 6,000 mi. in Kentucky, Tennessee, and Indiana. It has been penetrated 14 mi., and has many windings and offshoots, some of them but imperfectly explored. It is a dry cave, and the remains of its stalactite and stalagmite formations are dusty and dilapidated; consequently it is more remarkable for its extent, the size of its halls, and height of its domes, than for the variety and beauty of its scenery. It contains several small lakes or rivers, the largest, Echo River, being more than half a mile long. It rises and falls according as Green River is in flood or otherwise, there being an underground connection between them. The animals of the cave include blind, wingless grasshoppers, beetles, rats, etc., and the viviparous blind fish Amblyopsis.

Man, the most highly organized member of the animal world. The endeavor has often been made in classification to separate man from the brute creation. The more recent arrangements classify man and the monkeys in one order, making man the highest family or group of this order. From the purely anatomical point of view the differences which separate the anthropoid apes from man are in some respects less than those which separate these higher apes from apes lower in the scale. But the mental or psychical endowments of man oblige us to move him far above the highest quadrumana; and even the characters by which he is anatomically separated from the highest apes form a very distinct and appreciable series. The first grand characteristic of man is his *erect position* and bipedal progression. The lower limbs, with the feet broad and plantigrade and the well developed heel, are devoted exclusively to progression and supporting the weight of the body; while the upper limbs have nothing to do with progression, but subserve prehension entirely. The bones of the face in man do not project forward, while they are elongated in a downward direction; and the face and forehead are in the more civilized races situated nearly in the same plane, so that the face immediately underlies the brain. Similarly the development of a distinct chin is also a peculiarly human feature, and one which in the highest varieties of mankind becomes most marked. The great *cranial* capacity of man, or the greater size of the cranial or brain portion as compared with the facial portion of the skull, forms another noteworthy and distinctive character of the human form. The brain convolutions also are more numerous and complex than is the case with any other mammal. The teeth of man are arranged in a continuous series, and without any *diastēma* or interval. The development of hair, too, is very partial. The gorilla presents of all the apes the nearest approach to the human type taken in its entirety; but it differs in the relative number of vertebræ (13 dorsal and 4 lumbar, to 12 and 5 respectively in man), in the order of dental succession and in the presence of the interval or diastema, in the less prominent muscular development of the buttocks and calves, and in other minor differences. The orangs most closely approach man's structure in the number of ribs and in the form of the cerebrum, while they exhibit the greatest differences from him in the relative length of the limbs. The chimpanzees are most anthropoid in the shape of the cranium, in the arrangement and succession of the teeth and in the length of the arms as compared with that of the legs. Of the higher apes the gibbons are those farthest removed from the human type of structure. Chief among the psychical features, or rather among the results of the operation of the principal of *mind*, we note the possession of the moral *sense of right and wrong*. The possession of an articulate language, by which he can communicate his thoughts, is also the exclusive possession of man, and draws a sharp line or separation between him and all other animals. With regard to the geological history of man, the earliest traces yet discovered belong to the Post-Pliocene deposits in conjunction with existing species of shells and some extinct species of mammals. Man's advent upon the earth is consequently referred to a period much anterior to that which former limits and theological ideas prescribed. Among the modern theories regarding the origin of man may be noted those of 1, Darwin; that man is directly descended from an extinct form of anthropoid ape, with a tail and pointed ears, arboreal in its habits and an inhabitant of the Old World; further, that man has diverged into different races or sub-species, but that all the races agree in so many unimportant details of structure, and in so many mental peculiarities, that they can be accounted for only through inheritance from a common progenitor. 2, Wallace also affirms the original unity of man, and places him apart as not only the head and culminating point of the grand series of organic nature, but as, in some degree, a new and distinct order of being; maintaining that a superior intelligence has guided the development of man in a definite direction and for a special purpose, just as man guides the development of many animal and vegetable forms. 3, Carl Vogt holds a plurality of the race; adopts Darwin's idea of natural selection accounting for the origin and endowments of man, but rejects Wallace's idea of the higher controlling intelligence. 4, Mivart propounds a theory of a natural evolution of man as to

his body, combined with a supernatural creation as to his soul.

Man, Isle of, an island in the Irish Sea, equidistant about 27 mi. from England and Ireland, and 16 mi. from Scotland; area 145,325 acres, of which about two thirds are under cultivation. A range of hills extends throughout nearly the entire length of the island, culminating in Snaefell (2,024 ft). Lead and zinc are found in considerable quantities, especially the former. Fishing is an important industry, but the manufactures are almost entirely domestic. The island is governed by an independent legislature called the Tynwald, consisting of two branches—the Governor and Council and the House of Keys. Two judges or "deemsters" try civil and criminal cases. The Manx language, a Celtic dialect, is still in use, although all the inhabitants speak English. The principal towns are Douglas, Castletown, Peel, and Ramsey. It was purchased for the British crown from the dukes of Athole, in 1764, for $350,000, and finally, in 1829, certain remaining privileges were ceded by the duke on receiving an award of $2,080,000. Pop. 54,089.

Manaar', Gulf of, a part of the Indian Ocean between Ceylon and Hindustan, separated from Palk's Strait by a reef called Adam's Bridge, which runs between the two islands of Manaar (18 mi. by 2½ mi.) and Ramisseram. The gulf is noted for its pearl fisheries.

Mana'gua, a town in Central America, capital of the state of Nicaragua, near the southwest shore of the lake of same name, 32 mi. s.s.w. of Leon. Pop. about 18,000. The lake, about 38 mi. long and 16 broad, discharges itself into that of Nicaragua.

Man'akin, a species of birds, generally small and of brilliant plumage, and mostly confined to South America, a few species being found in Central America and Mexico. The typical genus includes the bearded manakin, and several others. An allied species is the beautiful orange manakin or cock-of-the-rock.

Ma'nasarowara, a lake of Thibet, north of the main chain of the Himalaya Mountains, about lat 30° 8′ n., lon. 81° 53′ e. It is almost circular in form, about 15 mi. in diameter, and is drained by the Sutlej.

Manatee', the sea-cow or lamantin, a gregarious aquatic mammal found on the coasts of South America, Africa, and Australia. They generally frequent the mouths of rivers and estuaries, and feed on algæ and such littoral land vegetation as they can reach at high tide. Their anterior limbs or swimming paws are furnished with nails, by means of which they drag themselves along the shore. They are large, awkward animals, attaining a length of 8 to 10 ft. as a rule, but sometimes growing to 20 ft. The skin is of a grayish color, sparsely covered with hairs. Their flesh is excellent, and they furnish a soft, clear oil which does not become rancid. There are several species, the principal being the American manatee, which inhabits the shallow waters of the east coasts of South and North America, and the African manatee. The dugong belongs to the same order.

Manby, Captain George William (1765–1854), b. in Norfolk. About 1808 he invented the apparatus known by his name for saving life from shipwrecked vessels near the coast, and was rewarded with about $35,000.

Manche (mänsh), La, a department of Northern France, bounded on the w., n., and n.e. by the English Channel, and landward by the departments of Calvados, Orne, and Mayenne. It is about 80 mi. long by 30 broad, and has an area of 2,263 sq. mi. Pop. 520,865.

Mancha, La, an ancient province of Spain, in New Castile, forming the chief part of the modern province of Ciudad-Real; famous as the scene of Don Quixote's adventures.

Manchester, Hartford co., Conn. Railroad, N. Y. & N. E. Industries: silk, paper, and woolen goods. Electric lamps and electrical power machinery are also made. Pop. 1900, 10,601.

Manchester, Hillsborough co., N. H., on Merrimac River, 57 mi. n. of Boston. Railroads: Boston & Maine, main line n. and s.; branches e. to Portsmouth, n.w. to Henniker, s.e. to Lawrence, and n.e. to Pittsfield. Industries: woolen and cotton mills, two iron foundries; locomotive works, seven shoe shops, machine shops, etc. Surrounding country agricultural. The town was first settled in 1772 by Scotch-Irish emigrants, and became a city in 1846. It is the fourth city in the Union in point of cotton and woolen manufactures. Merrimac River turns more spindles than any other river in the world. Pop. 1900, 56,987.

Manchester, Chesterfield co., Va., on James River, opposite the city of Richmond. Railroads: Southern, and the Atlantic Coast Line. Industries: railroad shops, cotton mills, spike plant, iron and nail works, paper twine co., flour and meal mills, oil co., wood working co., tannery, chemical works, furniture, ice, and other factories. The town was established in colonial days. Pop. 1900, 9,715.

Manchester, city, municipal and parliamentary borough and inland port of Lancashire, England; on the Irwell river, 32 m. e.n.e. of Liverpool and 188 m. n.n.w. of London. A ship canal, connecting it with the Mersey, enables the largest ocean steamers to enter the heart of the city. (See *Manchester Ship Canal.*) On the west side of the Irwell is Salford, connected by numerous bridges and considered as virtually a portion of the city. It has many important and handsome public buildings and many fine streets. The center of the town is largely occupied by immense piles of warehouses and offices, while factories and other manufacturing works are chiefly in the outskirts. Among the chief public buildings are the townhall or municipal buildings in the Gothic style, finished in 1877 at a cost of $5,266,320; the Assize Courts, also a fine specimen of modern Gothic, behind them being a well-arranged prison; the Royal Exchange, etc. Among the churches the first

place is due to the cathedral, a fine specimen of Perpendicular Gothic, built in 1422; but the soft stone of which it is built having necessitated numerous repairs, the edifice has a comparatively new appearance. The chief educational institution is Owens College, the nucleus of the Victoria University, founded in 1846 by a bequest of upward of $500,000 from John Owens. Cheetham's Hospital was founded under the will of Humfrey Cheetham in 1653 for the education of poor boys. Attached to the institution is a library of nearly 40,000 vols., the first free library in Europe. The Free Library, established in 1251, has a reference library in the main building of 85,000 vols., and six branches with upwards of 100,000 vols. Among the public monuments the most noteworthy is the Albert Memorial in front of the townhall. The chief manufacture is cotton, though woolen and silk fabrics are also produced. Metal manufactures, engineering, and the making of all kinds of machinery employ many hands. The manufacture of gas, supply of water, working of tramways, etc., are directly or indirectly in the hands of the corporation, and an extensive scheme is being proceeded with for bringing an improved water supply from Thirlmere in the Lake District. Its history is legendary down to the tenth century, when it was devastated by the Danes. In the twelfth century the woolen manufactures began to develop, and in 1301 it received municipal liberties and privileges. During the civil war the town suffered much at the hands of both parties. The introduction of machinery in cotton spinning toward the end of the eighteenth century gave power and direction to the trade of modern Manchester, and its progress since has been extraordinarily rapid. A temporary check resulted from our Civil War, which led to a cotton famine in 1862, causing the deepest distress in South Lancashire. Manchester now returns six members to Parliament, while Salford has three members. Pop. of Manchester, 505,343; of Salford, 198,136.

Manchester Ship Canal, a canal extending from Manchester, England, to the estuary of the Mersey river at Eastham. It is 35.5 m. long, twice as wide as the Suez Canal, and has a depth of 26 ft. It was ready for traffic on Jan. 1, 1894, and formally opened by Queen Victoria, on May 21, following. The construction of this canal cost $75,000,000. Through it the largest ocean steamers enter the heart of the city, which has now six miles of quayage and 100 acres of dock accommodations.

Mănchu'ria (or Manchooria) (Chinese *Shing-King*), a Chinese territory occupying the northeastern corner of the empire. It is bounded on the n. and e. by the Amur (or Amoor) and Usuri, which separate it from the Russian territory; on the w. by the provinces of Irkutsk, Mongolia, and Chih-le; on the s. by the Gulf of Leaotong, the Yellow Sea, and Korea. It is divided into three provinces, Shing-King, Feng-Tien, or Leaotong in the south, of which Mukden is the capital; Kirin in the center, with a capital of the same name; and He-Lung-Kiang in the north, with capital Tsitsihar. The total area is about 380,000 sq. mi. The administration is military, the governors of the two northern provinces being subordinate to the governor of Mukden. The Manchus are a hardy race, and their country has long been the great recruiting ground for the Chinese army; but of late years vast numbers of Chinese proper have flocked into it, so that now they by far outnumber the native race. In the seventeenth century the Manchus invaded China and placed their leader's son upon the throne. Since that time the Manchu dynasty has continued to reign in China, and the Manchu language has become the court and official language. The country is mountainous, but on the whole fertile. The climate is good, for though the winters are severe they are healthy and bracing. The vast forests of the north are rich in useful timber of all kinds. The principal food crops are pulse, millet, barley, and wheat. The vine, indigo, cotton, opium, tobacco, etc., are cultivated. The chief seaport is the treaty port Newchwang. Pop. est. at 22,000,000.

Man'dalay, the capital of Burma from 1860 to its annexation by India in 1886. It is situated in a level plain about 2 mi. from the left bank of the Irrawaddy. It consists of four concentric quadrangles, of which under native rule the innermost contained the palace, etc., the second which was surrounded by a moat and walls, contained the houses of the government officials, soldiers, etc., while outside dwelt the general body of the people. Since the British occupation the town has suffered severely from fires and floods. Pop. 187,910.

Manda'mus, in law, a command or writ issuing from a superior court, directed to any person, corporation, or inferior court, requiring them to do some act therein specified which appertains to their office and duty, as to admit a person to an office or franchise, or to deliver papers, etc.

Man'darin, the term applied by Europeans to government officials of every grade in China. The Chinese equivalent is *kwan*, which signifies literally a public character.

Man'deville, Bernard (1670–1733), poet and philosophical writer, b. in Holland.

Mandeville, Sir John de, the name adopted by the compiler of an extraordinary book of travels originally written in French between 1357 and 1371. An English version was made from the French MS. about the beginning of the fifteenth century. That part of the book which treats of the Holy Land may be a record of the author's experience, but the greater part is taken from the travels of the friar Odoric, written in 1330, and other sources. The first printed English edition is that of Wynkyn de Worde, 1499; and the best that of Halliwell, 1839, reprinted 1866. Mandeville had long the reputation of being the "father of English prose." He was said to have been b. at St. Albans about 1300, set out on his travels in 1322, returned in 1357, died and was buried at Liège; but much of his personal history is mere

invention, and the very name of the compiler of the travels is a matter of doubt.

Manding'oes, a negro tribe of West Africa, remarkable for their intelligence, and generally for the advances they have made in civilization. The original country of this people, who are now spread over a great portion of West Africa, was the north slope of the high table-land of Senegambia. They are nominally Mohammedans, are keen traders, work iron and gold, manufacture cotton cloth and leather, and cultivate a variety of crops. They live in small independent states, their clay-built walled towns often containing about 10,000 inhabitants.

Man'dolin, a musical instrument of the guitar kind. There are several varieties, each with different tunings. The Neapolitan has four strings tuned like those of the violin, G, D, A, E; the Milanese has five double strings (each pair in unison) tuned G, C, A, D, E. A plectrum is used in the right hand, the fingers of the left stopping the strings on the fretted finger-board.

Mandrake, the popular name of plants, natives of South and East Europe and Western Asia, and not uncommon in America and Britain. *M. officinâlis* has large tap-roots; the leaves radical, sessile, ovate, entire, and waved. There is no stem; but the flowers, which are white, with a bell-shaped corolla, stand upon simple stalks. The fruit is a large, two-celled berry of an orange color, containing many kidney-shaped seeds. The root possesses narcotic qualities,

Mandrake.

and from its occasional resemblance to the human figure was formerly supposed to possess an inferior kind of animal life, and to shriek when torn up. It was believed to have many magical virtues, and to be an aphrodisiac and a cure for barrenness.

Mandrill, a species of baboon, which is distinguished by the short or rudimentary tail, by the elongated dog-like muzzle, and by the presence of buttock callosities which are generally brightly colored. The mandrill inhabits Western Africa, where they associate in large troops. Full-grown males measure about 5 ft.; they are exceedingly strong and muscular, and fierce in disposition. It has cheek protuberances colored with stripes of brilliant red and blue.

Mandvi, seaport in the state of Cutch, Bombay, India. It is situated on the Gulf of Cutch, 36 mi. s. of Bhuj, the capital of the state, and is a port of call for British-India steamers. Pop. 35,980.

Mangalore', a seaport and military station of India, in South Canara district, Madras. It is a clean and prosperous town, and has large exports of coffee. There is a Roman Catholic College, and the Basel Lutheran Mission has its headquarters here. Pop. 32,099.

Man'ganese, chemical symbol Mn, atomic weight 55, a metal of a dusky white or whitish-gray color, very hard and difficult to fuse. Exposed to air it speedily oxidizes; it decomposes water with evolution of hydrogen. The common ore of manganese is the dioxide, black oxide, or peroxide, the pyrolusite of mineralogists, a substance largely employed in the preparation of chlorine for the manufacture of bleaching powder or chlorate of lime. It is employed in the manufacture of plate glass, to correct the yellow color which oxide of iron is apt to impart to the glass. It is also used in making the black enamel of pottery. Other oxides are the protoxide, sesquioxide, the red oxide, and permanganic acid. The latter is only known in solution or in a state of combination. It is largely used in analytical chemistry. Metallic manganese is obtained by reduction of the oxide by means of heat and finely divided carbon. It resembles iron in appearance and properties, is a constituent of many mineral waters, and is employed in medicine. In steel manufacture it is used in certain proportions with advantage as regards the ductility of the steel and ability to withstand forging, and in other manufacturing operations it forms an important element.

Mango, the fruit of the mango tree, a native of tropical Asia, but now widely cultivated throughout the tropics. Fine varieties pro-

Common Mango.

duce a luscious, slightly acid fruit much prized for dessert. The large, flat kernel is nutritious, and has been cooked for food in times of scarcity.

Mangrove, a genus of plants consisting of trees or shrubs which grow in tropical countries along the muddy beaches of low coasts, where they form impenetrable barriers for long distances. They throw out numerous roots from

the lower part of the stem, and also send down long, slender roots from the branches, like the Indian banian tree. The seeds germinate in the seed vessel, the root growing downward till it fixes itself in the mud. The wood of the *R. Mangle* is dark red, hard, and durable, and the bark is used for tanning. The fruit is

A Mangrove Swamp.

said to be sweet and edible, and the fermented juice is made into a kind of light wine.

Manhattan College, a Roman Catholic institution of higher learning in New York City, opened in 1849 as an academy and incorporated under its present name in 1863. It comprises a college of liberal arts, a department of civil engineering, a commercial course and preparatory department. In 1904 it had a faculty of 38 instructors, 542 students and a library containing 10,600 volumes. The president is Rev. Brother Jerome, F. F. C.

Manhattan Island, an island at the head of New York Bay, constituting the Borough of Manhattan in New York City. It is situated between the Hudson or North River and the East River and separated from the mainland on the north and northeast by the Harlem River. The maximum length of the island is 13¼ miles, the width 2¼ miles and the area 22 square miles. It has a wharfage front of 22 miles. See *New York.*

Mani'la, the principal city of the island of Luzon and of all the Philippine Islands, and formerly the residence of the Spanish governor, lies on the bay of the same name, and at the mouth of the river Pasig. It consists of an old fortified city with extensive suburbs, in which are the mass of the population, and the business premises, factories, and residences of the European inhabitants. Manila is the center of commerce of the Philippines, and exports sugar, tobacco, cigars, and cheroots, indigo, Manila hemp, coffee, mats, hides, trepang, rice, etc. It imports U. S. and British cloths, hardware, etc., and a great variety of articles, tea, pottery, etc., from China. The manufactures consist chiefly of cigars and cheroots, and hemp and cotton fabrics. Manila was founded by Miguel Lopez de Legaspé, the conqueror of the Philippine Islands, in 1571. It has frequently suffered from earthquakes, one of the most disastrous being that of 1863. The city was surrendered by the Spaniards to the American naval and military forces in the Philippines, August 13, 1898. At that time the Philippine insurgents were surrounding the city and in the early part of 1899 they succeeded in breaking through the American lines which invested the city, and burned a considerable portion of it. The population is estimated at about 200,000.

Manistee, Manistee co., Mich., on Lake Michigan, 147 mi. north of Grand Rapids. Railroads: F. & P. M.; M. & N. E.; M. & S.; M. & G. R. Industries: lumber mill, iron works, seven large saw mills and salt blocks Surrounding country agricultural. The town was first settled in 1837, and became a city in 1882. Pop. 1900, 14,260.

Manitch (Manytch), a river in South Russia, which in its course connects a series of long narrow salt lakes, and joins the Don near Tcherkask. It has been proposed to utilize it in the construction of a canal to join the Sea of Azov and the Caspian.

Man'ito (Man'itou), among certain of the North American Indians, a name given to whatever is an object of religious awe or reverence, whether a good or evil spirit or a fetish. Two manitos or spirits are spoken of by preeminence, the one the spirit of good, the other the spirit of evil.

Manito'ba, a province of the Dominion of Canada, bounded on the s. by the U. S. and the province of Ontario, and on the w., n., and e. by the Northwest Territories, namely Assiniboia, Saskatchewan, and Kewatin. It occupies a position nearly in the center of the North American continent, and extends from 49° to 52° 50′ n. lat.; and from 89° to 101° 20′ w. lon.; the area is 64,066 sq. mi. The climate is warm in summer, but very cold in winter. The summer mean is about 66°, but in winter the thermometer sinks to 30°, 40°, and sometimes 50° below zero, though this severe cold is mitigated by a clear dry atmosphere. The summer months are part of May, June, July, August, and September. The principal rivers are the Assiniboine and the Red River, the latter having the greater part of its course in the U. S. The largest lakes are Winnipeg, Winnipegosis, and Manitoba, the two former being only partially included within the boundaries of the province. The greater part of the province consists of level, treeless prairie land, covered with a rich vegetable growth in summer. The banks of the streams, however, are lined with a timber belt extending from about half a mile to ten miles back. The soil is generally a rich black mold, resting partly on a limestone formation, and partly on a thick coat of hard clay. Wheat, oats, barley, Indian corn, hops, flax, hemp, and all kinds of garden vegetables produce excellent crops. For wheat growing Manitoba presents peculiar advantages. Potatoes and all other root crops thrive well, and the prairie grasses furnish good hay.

Game is abundant, and the rivers and lakes teem with fish. Manitoba is divided into five electoral districts for Dominion elections, each sending one member to the House of Commons. The province likewise sends three members to the Senate of the Dominion. The public affairs are administered by a lieutenant governor, an executive council of five members, and a legislative assembly of thirty-one members elected for four years. The school system established by law is entirely denominational, and is supported by local assessments, supplemented by legislative grants. The capital of the province is Winnipeg, situated at the junction of the Assiniboine and Red Rivers; other towns are Portage la Prairie, Brandon, Selkirk, and Emerson. The nucleus of Manitoba was the Red River Settlement established in 1812, but little progress was made till the territory became part of Canada in 1870. The trade of the province has been greatly increased since 1878, when Winnipeg was connected with the railway system of the U. S.; and the construction of the Canadian Pacific Railway, which crosses the province from east to west, has added materially to its progress and prosperity. Pop. 1901, 246,464.

Manitoba Lake, a lake of Canada, province of Manitoba, 30 or 40 mi. s.w. of Lake Winnipeg, about 120 mi. in length by about 25 mi. in breadth; area 1,900 sq. mi. It receives the waters of several lakes at its northern extremity, and at its southern White Mud River. It discharges into Lake Winnipeg, through the Dauphin River.

Manitou, a summer resort at the base of Pike's Peak, Col., 6,296 ft. above the level of the sea. It is the Saratoga of the West, with soda springs and several large summer hotels. Pop. 422.

Manitou'lin Islands, a group of North American islands in Lake Huron, consisting of Grand Manitoulin, 80 mi. long by 5 to 30 broad, Little Manitoulin, and Drummond Island. The two former belong to Canada, the latter to the U. S. Pop. about 2,000, more than one half being Indians.

Manitowoc, Manitowoc co., Wis., on Lake Michigan, 150 mi. n. of Chicago. Railroads: C. & N. W., and Wisconsin Central. Industries: malt house, steel works, ax, glue, and paper box factories, iron foundry, farming implement factory. Surrounding country agricultural. It became a city in 1873. Pop. 1900, 11,786.

Mankato, Blue Earth co., Minn., on Minnesota River, 86 mi. s.w. of St. Paul. Railroads: C. St. P. M. & O.; C. & N. W.; C. M. & St. P.; and M. & St. L. Industries: cement works, two flouring mills, knitting mills, candy, cracker, linseed oil factories, machine shops, packing house, malt mills, and brewery. Surrounding country agricultural. The town was first settled in 1853, and became a city in 1868. Pop. 1900, 10,599.

Mann, Horace (1796-1859), one of America's best-known educators, was born at Franklin, Mass. He worked on a farm until he was 20 years of age, in the meantime going to the country school about eight or ten weeks during each year. When he left the farm he took up the study of Latin and Greek, and in 1816 entered the junior class at Brown University, graduating three years later. He studied law and was admitted to the bar in 1823. Four years later he was elected to the Massachusetts state legislature and in 1833 was returned to the upper house. In 1837 he was appointed secretary of a committee appointed by the state legislature to revise and reorganize the common-school system of the state. He devoted his whole time to this work, giving up his profession and his seat in the senate. He held the position for twelve years. He published *The Common School Journal* and a series of *Annual Reports.* In one of these reports he compared the systems of instruction followed in Prussia with those in use in Massachusetts. In 1848 Mann was elected to Congress to fill the vacancy caused by the death of John Quincy Adams. He tried to have the government establish a bureau of education at Washington, but this was not done until much later. Mann's chief work in education is the reform, due largely to his *Annual Reports,* which he brought about in the common and normal schools of Mass. Pl. 27, Vol. III.

Mannheim (măn'hīm), a town of Germany, grand-duchy of Baden, on the right bank of the Rhine, near the confluence of that river with the Neckar. It has an extensive harbor and docks, and is the chief commercial town on the Upper Rhine. Industries include the manufacture of machinery, sugar, chemicals, wall paper, tobacco, etc. Pop. 61,210.

Mans, Le (lē măn), a town of France, capital of department Sarthe, on a height above the Sarthe, 115 mi. s.w. of Paris. The principal edifice is a fine Gothic cathedral, in part supposed to be of the tenth century. The principal manufactures are woolen and linen goods, machinery, leather, etc. Le Mans existed in the time of the Romans under the name of Cenomani; it was the birthplace of Henry II, the first of the Plantagenet kings of England; it witnessed the final dispersion of the Vendean army in 1793; and was the scene of the defeat of the French army under Chanzy by the Germans under Prince Frederick Charles, January, 1871. Pop. 57,412.

Mansard (or Mansart) (măn-sär) François (1598–1666), French architect, b. in Paris. He is said to be the inventor of the curbroof which bears his name. His nephew, Jules Hardouin Mansard (1645–1708), who studied under Francois, designed the Palais de Versailles, the Hôtel des Invalides and the Palace Vendôme.

Mansard Roof, a roof formed with an upper and an under set of rafters on each side, the under set approaching more nearly to the perpendicular than the upper.

Manse, in Scotland, the dwelling house of a parish minister of a rural parish. Every minister of a rural parish is entitled to have a manse erected and upheld by the heritors.

Mansfield, Richard (1857——), American actor, b. in Heligoland; studied for East Indian civil service; but came to Boston and opened

an art studio. In 1875, he returned to England and went on the stage, playing at first small parts in comic opera, then in comedy, and later in tragedy. He made his first great hit as Baron Chevrial in *A Parisian Romance* at the Union Square Theatre, N. Y. He began his career as a star May 3, 1886, at Madison Square Theatre, N. Y., in Prince Karl. Mansfield is one of the greatest of living actors. He manages his own company. Among his parts are Brutus in *Julius Cæsar* and the title role in *Richard III, Cyrano de Bergerac, Monsieur Beaucaire, Dr. Jekyll and Mr. Hyde,* and *Beau Brummell.* Pl. 6, Vol. I.

Mansfield, a town, England, Nottinghamshire, 14 mi. n. by w. of Nottingham, in a deep valley, surrounded by vestiges of Sherwood Forest. There are cotton mills, manufactures of silk and cotton hosiery, lace thread mills, etc. Pop. 1891, 15,925.

Mansfield, county seat of Richland co., O., 80 m. s. w. of Cleveland; on the B. &. O., the Erie and the Pennsylvania railroads. Interurban lines connect it with two points on the Clev., Cinn., Chi. & St. L. It lies in an agricultural region, is an important trade center and is noted for its manufactures, which includes boilers, engines, engine fittings, brass goods, threshing machines, street cars, and electrical supplies. It is the seat of the Ohio State Reformatory. Pop. 1900, 17,640.

Mansu'ra, a town of Lower Egypt on the Damietta branch of the Nile, 34 m. s. w. of Damietta; on the Cairo-Damietta R. R. It has extensive cotton manufactures and a large trade in raw cotton. Pop. 36,131.

Mantegna (mân-ten'yâ), ANDREA (1431–1506), early Italian painter, b. at Padua. About 1459 he went to Verona, where he painted a magnificent altar piece in the church of St. Zeno. At Mantua, where he was patronized by the Marquis Gonzaga, he opened a school, and painted among other important works the *Triumph of Julius Cæsar,* now at Hampton Court. One of the latest and best of this artist's works is the *Madonna della Vittoria,* now in the Louvre at Paris. There are others of his works in the Louvre, in particular *Wisdom Vanquishing Vice,* and a mythological work, *Parnassus.* Mantegna excelled in perspective, which was then a rare merit; he also excelled in engraving, and introduced the art of engraving on copper into Upper Italy.

Manteuffel (mân'toi-fl), EDWIN, BARON VON (1809–1885), German field marshal. He entered the army in 1827 and advanced rapidly, becoming lieutenant general of cavalry 1861. He took part in the Danish war of 1864, and next year was appointed governor of Schleswig. During the war between Prussia and Austria he commanded the army of the Main. He played a distinguished part in the Franco-German War, especially in driving Bourbaki's army across the frontier into Switzerland. From June, 1871, to July, 1873, he commanded the army of occupation in France, and was made field marshal. In 1879 he was appointed governor general of Alsace-Lorraine.

Mantis, a genus of orthopterus insects, remarkable for their grotesque forms. They frequent trees and plants, and the forms and colors of their bodies and wings are so like the leaves and twigs which surround them as to give them remarkable power to elude observation. The praying-mantis has received its name from the peculiar position of the anterior pair of legs, resembling that of a person's hands at prayer. In their habits they are very voracious, killing insects and cutting them to pieces. They are natives chiefly of tropical regions, but are also found in France, Spain, and the warmer parts of Europe.

Man'tua (Italian, *Mantŏva*), a strongly fortified town of Northern Italy, one of four forming the *Quadrilateral,* capital of the province of the same name, 80 mi. e.s.e. of Milan, on an almost insular site on the Mincio, which here divides into several arms, and afterward spreads out into a marshy lake. The manufactures are limited. The trade is chiefly in the hands of the Jews, who live in a separate quarter called Ghetto. Mantua is a very ancient city, having been founded, it is said, by the Etruscans before the building of Rome. The Gonzagas governed it for about three centuries with great ability, and distinguished themselves by the splendor of their court and their patronage of literature and art. Vergil was born at the adjoining village of Andes, supposed to be the modern Pietole. Pop. 28,048. The province, which is intersected by the Po, Mincio, and other streams, produces rice, wheat, silk, wine, etc.; area 961 sq. mi.; pop. 315,314.

Manual Training, a system of instruction for training the hand and eye. When carried to the extent of preparing the pupils for a trade or an occupation it becomes industrial education, and is confined to special schools, like institutes of technology and industrial schools. Manual training for children was first introduced into a charitable school in Italy, in 1686. The girls received instruction in needlework and the boys in shopwork. The common schools of the leading countries of Europe, and both common and high schools in many cities in the United States now have manual training in their courses of study. The boys are taught the elements of shopwork and the girls needlework, cooking, and in some schools wood carving.

Manures, vegetable, animal, and mineral matters introduced into the soil to accelerate vegetation and increase the production of crops; substances used to improve the natural soil, or to restore to it the fertility which is diminished by the crops annually carried away. Animal substances employed as manures comprehend the putrefying carcasses of animals, ground bones, blood, the excrements of animals, as the dung of horses, cattle, sheep, poultry, etc.; urine, guano (the decomposed excrement of aquatic birds); the scrapings of leather, horn, and the refuse of the shambles; the hair or wool of animals. Liquid manure, consisting of town sewage, the drainings of dung-heaps, stables, and cow-houses, is largely employed in many districts. Almost every kind of vegetable substance, in one state or

another is used as manure. The principal mineral substances employed as manures are lime, chalk, sand, clay, marl; sulphates of potash, soda, ammonia, and magnesia; nitrates of potash and soda; and phosphates of lime. It is from containing one or other of these substances that apatite, basic slag, cubic niter, kainite, etc., are so valuable. Manures are usually distributed over the surface of the land and then plowed or harrowed into the soil; or they may be applied in drills when the object is to give direct benefit to the young plant. The kind of manure required for each crop depends on the nature of the crop, the quality and composition of the soil, and many other conditions. Modern researches upon plant nutrition, and the chemistry of agriculture in general, have shown us that the food of plants may be classed under the two headings of *air food* and *mineral food.* Air food consists of ammonia, water, and carbon dioxide; mineral food, of those substances which remain as ash when the plant is ignited. The former class of food is supplied to the plant partly from the atmosphere and partly from the soil, the latter from the soil entirely. In the production of food by natural processes of plant growth a certain amount of air food and also of mineral food is abstracted from the soil, those amounts varying for different species of plants; if this food be returned to the soil, then a further growth of plants may be expected; if, however, seed is sown in the partially impoverished soil, there must be a decrease in the amount of crop obtained from that soil. As the plants serve to nourish animals, it follows that the substances which have been withdrawn from the soil by the plants may be returned to it in the shape partly of animal excreta, and partly of ground bones, etc. Different plants require different kinds of food: if, therefore, the kind of crop grown on the same land be varied from year to year, and if the soil be tilled so as to unlock its natural supplies of mineral food, it will be found that the average yield of crops may be maintained simply by the restitution to the land of that amount of food which has been removed from it by the plants. In this restitution it must be borne in mind that it is not only mineral but also air food which is to be restored. Plants undoubtedly draw large supplies of nitrogen and carbon from the atmosphere, but it has been abundantly proved that unless this supply is augmented by artificial sources the plants soon begin to fall off and the yield of crop very sensibly to diminish. The theory of manuring consists, then, in maintaining in the soil such an amount of plant food, both mineral and organic, as shall enable us to reap the largest possible amount of crops from that soil.

Manuscripts are literary writings of any kind, whether on paper or any other material, in contradistinction to printed matter. Previous to the introduction of printing all literature was contained in manuscripts, and the deciphering and proper use of these form an important part in the science of palæography. All the existing ancient manuscripts are written on parchment or on paper. The paper is sometimes Egyptian (prepared from the real papyrus shrub), sometimes cotton or silk paper. The most common ink is the black, which is very old. Red ink of a dazzling beauty is also found in ancient times in manuscripts. With it were written the initial letters, the first lines, and the titles, which were thence called *rubrics.* Blue, green, and yellow inks were more rarely used. On rare occasions gold and silver were the mediums, though from their cost they are oftenest confined to initial letters. The most ancient manuscripts still preserved are those written on papyrus which have been found in Egyptian tombs. Several of these are of date considerably before the Christian era, notably fragments of the *Iliad* and a papyrus containing the orations of Lycophron and Euxenippus, 11 ft. in length and containing 49 columns of writing. Next to them in point of age are the Latin manuscripts found at Herculaneum. Then there are the manuscripts of the imperial era of Rome, among which are the Vatican Terence and Septuagint, and the Alexandrine codex of the British Museum. Numerous manuscripts of the Old and New Testaments of the second and third centuries exist; and among those of profane authors may be noted that of *Vergil* (fourth century), in the Laurentien Library at Florence; a *Livy* (fifth century), in the Imperial Library of Vienna; the *Jewish Antiquities* of Josephus, in the Ambrosian Library, Milan, etc. It was a common custom in the Middle Ages to obliterate and erase writings on parchment, for the purpose of writing on the materials anew, manuscripts thus treated being called *palimpsests.*

The art of illuminating manuscripts dates from the remotest antiquity. The Egyptian papyri were ornamented with vignettes or miniatures attached to the chapters, either designed in black outlines or painted in primary colors in distemper. The oldest ornamented Greek and Roman manuscripts that have survived are the *Dioscorides of Vienna* and the *Vergil of the Vatican,* both of the fourth century, and having vignettes or pictures in a Byzantine style of art. From the eighth to the eleventh century the initial letters in use were composed of figures of men, quadrupeds, fishes, birds, etc. The initials of the twelfth century are made up of masses of conventional foliage interspersed with the animal figures of the preceding centuries. Continuous borders, with vignettes, tail-pieces, etc., were also prevalent in later times, and some manuscripts are ornamented with very artistic designs. In the sixteenth century the art of illumination became extinct. Some attempts have been made to revive it by adorning paper, parchment, and vellum with designs in colors or metals.

Manu'tius, Aldus (or Aldo Manuzio) (about 1447–1515), Italian printer. He was the inventor of the italic or cursive character, hence called *Aldine.* His business was continued by his son Paolo Manuzio, b. 1512, d. 1574, a man distinguished as a classical scholar

no less than as a printer; and by his grandson Aldo, b. 1547, d. 1597.

Manzanillo (mân-thâ-nēl′yō). 1, A seaport on the south coast of Cuba, with a good roadstead. Pop. 8,000. 2, A seaport of Mexico, state of Colima, on the Pacific. Pop. 4,000.

Manzo′ni, ALESSANDRO (1784–1873), an Italian poet and novelist. After his father's death in 1805 he lived for some time in Paris with his mother, and in 1808 he married the daughter of a Genoese banker, under whose influence he settled down into the fervent Catholicism which colored all the rest of his life. His chief works are the *Inni Sacri*, a series of sacred lyrics; *Il Cinque Maggio*, a powerful ode on the death of Napoleon; the tragedies *Il Cont di Carmagnola*, and *Adelchi;* and his great novel *I Promessi Sposi* (*The Betrothed*).

Map, a projection on a plane surface of the whole or a part of the earth's surface, showing its main features in more or less detail. The earth being a spheroid, its surface cannot be made to coincide rigorously with a plane; and it therefore becomes necessary to have recourse to a *projection*, that is, a plan on a plane surface, which indicates with sufficient correctness the relative positions, dimensions, etc., of the different parts of the spherical surface. A nautical map is usually called a *chart*. A map of the earth, or a portion of the earth, usually exhibits merely the positions of countries, mountains, rivers, lakes, cities, etc., relatively to one another, and by means of lines of latitude and longitude relatively to every other point on the earth's surface. But a map may be so colored or shaded as to give a variety of information: for example, to indicate the geological structure, the amount of rainfall, or other meteorological phenomena, the results of statistical inquiry, the languages spoken, etc. Hence we have geological, meteorological, linguistic, and other kinds of maps. We find traces of maps among the Egyptians in the times of Sesostris (B. C. 1618), who caused his hereditary dominions and his conquests to be represented on tablets for his people. The first attempt to draw a map of the whole known world was made by Anaximander of Miletus (B. C. 611–547). Ptolemy (flourished 126–161 A. D.) drew maps according to the stereographic projection. Modern map-making was identified in its early days with the names of Abraham Ortelius, Gerhard Mercator (b. 1512, d. 1594), William and John Blaeu (who produced 616 maps). It is only, however, during the present century that mathematically accurate surveys and delineations of the earth's surface have been made.

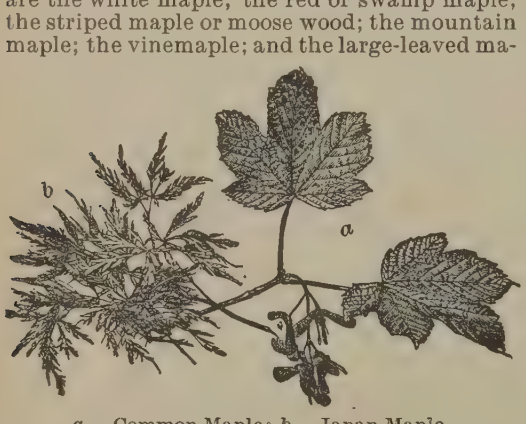
Map Making.—A drawing is made with India ink of the size the map is to be. All the lettering is put in with a pen, but merely to indicate the place where the type must print the names of the counties, towns, etc. When the drawing is complete, it is taken to the engraving room and turned over to the map engraver. This workman takes a smooth-faced copper plate and blackens the face by holding it over a smoking lamp or painting it with lampblack, and then covers it with a composition made of wax and gum, laying on the composition to the thickness of blotting paper. To get the composition even, the copper plate is slightly heated so that the composition will melt and run evenly. When the plate is coated, it is ready to receive a transfer of the drawing. The back of the paper on which the map is drawn, is covered lightly with black, brown, or blue chalk, and this chalked surface is laid upon the composition which covers the copper plate, and the engraver with a fine steel pencil goes over every line and mark in the drawing, and as the steel point moves over the paper the drawing is copied on the composition. The composition is white and the chalk lines stand out conspicuously. The plate is now ready for the graver, a V-shaped tool used by the engraver. He goes over the chalk lines, cutting out the wax composition to the copper plate. As the plate was first coated with lampblack the work may be readily seen as the graver leaves a black line wherever it touches the copper. The engraver does not cut out the letters. He sets the names up in type. He places the type in a holder, and then heating the type slightly, presses it into the wax to the copper. The holder is so arranged that the type can be set up either in a curved or straight line, and this accounts for the various ways in which the names of towns, etc., appear upon maps. When an exact copy of the drawing, with the names marked in type, is made upon the plate, the engraving is "built up" by the engraver. He takes a piece of the wax composition about the size and form of a lead pencil, and with a heated iron tool which looks like a piece of darning needle stuck into a handle, he builds up little mounds of wax on each side of the lines and letters. This is done for the purpose of obtaining the "relief," because all the time he has really been making a mold in which to cast a copper electrotype. To pour melted copper into this mold would melt the wax instantly, so the electrotyping process is used. The engraved plate or mold is hung in a bath after first being coated with graphite. Close to it is hung a pure copper plate. To each plate is connected a wire leading from a small dynamo. The current passes from the pure copper plate to the mold through the liquid, and carries with it the copper which it deposits in the mold, thus really making a copper cast of it. When enough copper has been deposited, the mold is taken off. This thin shell is backed up with metal to make it solid and strong. It is then ready to be placed in the press to print the map. It requires about six weeks' work on an engraving to make a map 11x14 inches. The electrotype thus made is used to print the black map. For other colors used in a map separate plates must be made.

Most of the maps made by or for the government are not made by the relief process but are engraved on steel, copper, or stone, and the prints are taken from these. In making a globe 24 pieces of a single map are required.

Map (or Mapes), WALTER (about 1150–1210),

scholar and poet of the twelfth century, a native of the Welsh Marches. He became archdeacon of Oxford in 1199; contributed to the Arthurian cycle of romance, the romances of the *Quête du Saint Graal*, *Lancelot du Lac*, and the *Mort Artus;* was the author of a curious book, *De Nugis Curialium*, a notebook of the events of the day and of court gossip; and to him is attributed a collection of rhymed Latin verse, in which the abuses of the church are hit off with vigor and humor. Among the most remarkable of these are the satirical *Apocalypse* and the *Confession of Bishop Golias.*

Ma'ple, a name for trees peculiar to the northern and temperate parts of the globe. About fifty species are known, distributed through Europe, North America, and different parts of Asia. The sugar or rock maple is the most important species; this yields maple-sugar, which in many parts of the U. S. is an important article of manufacture. A tree of ordinary size will yield from 15 to 30 gallons of sap yearly, from which are made from 2 to 4 lbs. of sugar. The knotted parts of the sugar-maple furnish the pretty *bird's-eye maple* of cabinetmakers. Some other American species are the white maple; the red or swamp maple; the striped maple or moose wood; the mountain maple; the vinemaple; and the large-leaved ma-



a.—Common Maple; *b.*—Japan Maple.

ple. Two species are common in Britain, the great maple, often miscalled sycamore, and the common maple. The wood of the former is valuable for various purposes, as for carving, turnery, musical instruments, wooden dishes, etc. Another well-known species is the Norway maple, often planted in Britain as an ornamental tree.

Mar'abouts (Marabuts), among the Berbers of Northern Africa, are saints or sorcerers, who are held in high estimation, and who exercise in some villages a despotic authority. They distribute amulets, affect to work miracles, and are thought to exercise the gift of prophecy. The name Marabouts is also used as equivalent to Almoravides.

Maracaibo (mȧ-rȧ-kī'-bō), a seaport of Venezuela, on the western side of the strait which unites the lake and gulf of the same name, about 20 mi. from the sea. There is a good trade in coffee, cacao, leather, hides, medicinal plants, etc. Pop. 34,284. The Lake of Maracaibo is about 98 mi. long, and 80 broad at the widest part. It communicates, by a strait about 18 mi. long and 3 broad, with the gulf of the same name, which is an inlet of the Caribbean Sea, 90 mi. in length, and about 60 mi. in width at the entrance.

Marajo (mȧ-rȧ-zhō'), an island of Brazil, formed by the estuaries of the Amazon and Pará, and belonging to the province of Pará; length 180 mi.; breadth 125; pop. (chiefly Indians and Mestizoes), 20,000.

Maranham (or Maranhão) (mȧ-rȧ-nyam' mȧ-rȧ-nyoun'), a province of Brazil, on the n. e. coast; area 177,566 sq. mi. A considerable part of the surface is occupied by forests, yielding excellent timber and dye woods. The soil is very fertile, producing maize, cotton, sugar, rice, cocoa, pimento, ginger, etc. Pop. 488,443. The capital, Maranhão (San Luiz de M.), is a prosperous, well-built city, on an island of the same name, carrying on a good trade in cotton, caoutchouc, hides, etc. Pop. 35,000.

Marat (mȧ-rä), Jean Paul (1744–1793), one of the most infamous leaders of the French Revolution, b. near Neuchâtel. He studied medicine at Paris, and previous to 1789 had spent many years in travel, visiting London, Edinburgh, Dublin, Amsterdam, etc., supporting himself by giving lessons in the modern languages, and at intervals publishing works on medical and scientific subjects. The first breath of the revolution; however, brought him to the front, and when Danton instituted the club of the Cordeliers, Marat became the editor of the *Publiciste Parisien*, better known under its later title *L'Ami du Peuple*, which was again changed to the *Journal de la Republique Française*, a journal which was the organ of that society, and soon became the oracle of the mob. It early advocated the most extreme measures, and the tone became more furious as Marat was inflamed by the prosecutions of the authorities. His paper was issued from various places of concealment until Aug. 10, 1792, after which he took his seat at the commune, and played a leading part in the assassinations of September (1792). He was a member of the terrible committee of public safety, and of the convention where General Dumouriez and the Girondists, who endeavored at first to prevent his taking his seat, were the special objects of his attack. The establishment of the revolutionary tribunal, and of the committee for arresting the suspected, was adopted on his motions. On the approach of May 31, as president of the Jacobin club he signed an address instigating the people to an insurrection, and to massacre all traitors. For this Marat was delivered over to the revolutionary tribunal, which acquitted him; and the people received him in triumph and covered him with wreaths. He was assassinated shortly after by Charlotte Corday, July 13. His remains were deposited in the Pantheon with national honors, but were subsequently removed.

Marathi (mȧ-rät'hē), a language of Southern India, closely allied to Sanskrit and written in the Sanskrit character. It is the vernacular

of some sixteen million people, mostly in Hyderabad and Bombay Presidency.

Mar'athon, a village of ancient Greece, in Attica, about 20 mi. n.e. of Athens. It was situated (probably on the site of the modern Vrana) on a plain which extends for about 6 mi. along the seashore, with a breadth from 1½ to 3 mi. Famous for the overthrow of the Persians by the Athenians under Miltiades, 490 B.C.

Marble, the name given to certain varieties of limestone capable of receiving a brilliant polish, and which, both from their durability and the beauty of the tints of many of them, have at all periods of the world been greatly in request for purposes of art or ornament. White statuary marble is a pure carbonate of calcium. Marbles have been divided into seven varieties or classes, viz., 1, *marbles of a uniform color,* comprehending solely those which are either white or black; 2, *variegated marbles,* or those in which the spots and veins are interlaced and disposed without regularity; 3, *shell marbles,* or those which are in part made up of shells; 4, *lumachelli marbles,* or those which are apparently wholly formed of shells; 5, *cipolino marbles,* or those which are veined with green talc; 6, *breccia marbles,* or those which are formed of angular fragments of different marbles united by a cement of some different color; 7, *pudding-stone marbles,* or those which are formed of reunited fragments, like the breccia marbles, only with the difference of having the pebbles rounded in place of being angular. By ancient or *antique marbles* is understood those kinds made use of by the ancients, the quarries of which are now, for the most part, exhausted or unknown. These include Parian marble, Pentelic marble, Carrara marble, etc.

Marblehead, Essex co., Mass., on Massachusetts Bay, 18 mi. n.e. of Boston. Railroad, Boston and Maine. Industries: shoe factories and seed-growing establishments. It has a fine harbor, and is an important fishing center. Pop. 1900, 7,582.

Marcellus, MARCUS CLAUDIUS, a Roman general, five times consul (222, 215, 214, 210, and 208 B. C.); the first Roman who successfully encountered Hannibal in the Second Punic War; and the conqueror of Syracuse (212 B. C.). He was killed in a skirmish with the Carthaginians in 208 B. C.

March, originally the first month of the Roman year. Till the adoption of the new style in Britain (1752), the 25th of March was the first day of the legal year; hence January, February, and the first twenty-four days of March have frequently two years appended, as Jan. 1, 170½, or 1701–2.

Marconi, GUGLIELMO (1875–——), a celebrated electrical engineer; b. at Marzabotto, Italy, in 1875; educated at the University of Bologna. Marconi is of Italian and Irish parentage; he showed remarkable aptitude for electrical science at an early age, and has given a number of years to the study of wireless telegraphy. His latest experiments have attracted wide attention. See *Wireless Telegraphy.* Pl. 25, Vol. III.

Marchena (mär-chā'nä), a town of Spain, in Andalusia, province of Seville, and 30 mi. e. by s. from the city of that name. There are sulphur springs in its vicinity. Pop. 13,768.

Marco Polo. See *Polo.*

Marcus Aurelius. See *Aurelius Antoninus.*

Marengo, a village in Italy, in the province of Alessandria, and so near the town of that name as to be considered one of its suburbs; celebrated for the battle of June 14, 1800, when the French under Bonaparte defeated the Austrians under Melas.

Mareo'tis (or Mariout), a lake of Lower Egypt, separated from the Mediterranean by the long narrow belt on which Alexandria stands. The main expanse is about 28 mi. long by 20 broad, and lies 8 ft. below the sea level. Salt is extensively made here by evaporation.

Margaret (1353–1412), queen of Denmark, Norway, and Sweden, called the *Northern Semiramis,* the daughter of Waldemar III, king of Denmark; b. at Copenhagen, married to Hakon, king of Norway, in 1363. The death of her husband in 1380 placed Norway in her hands; that of her son Olaf in 1387 enabled her to secure the throne of Denmark, to which she had previously brought about his election; and after defeating Albert, the Swedish king, she also obtained possession of the throne of Sweden. She endeavored to place the union of the three kingdoms on a permanent basis by the celebrated Act of Union, or Treaty of Calmar (1397). She died, after having raised herself to a degree of power then unequaled in Europe from the time of Charlemagne.

Margaret of Anjou (1425–1482), daughter of René, titular king of Sicily, was b. at Pont-à-Mousson, in Lorraine, and married in 1443 to Henry VI of England. The imbecility of the king made her practically regent, and her power being contested by the Duke of York, a claimant of the throne by an elder line, the protracted Wars of the Roses commenced. After a long struggle the wars ended in 1471; she and her son were made prisoners, and the latter, when led into the presence of his royal victor, was killed. Henry soon after died or was murdered in the Tower, and Margaret remained in prison four years. Louis XI ransomed her for 50,000 crowns.

Margaret of Valois (1492–1549), queen of Navarre, sister of Francis I of France, was b. at Angoulême. She was brought up at the court of Louis XII, and married the Duke of Alençon in 1509, became a widow in 1525, and in 1527 was espoused to Henry d'Albret, count of Béarn and titular king of Navarre. From this time she resided at Béarn, assisting in the development of the resources of the small kingdom, and making it a center of liberal influence. She possessed no ordinary culture, being credited with a knowledge of six languages and the authorship of several works, of which the chief were *Le Miroir de l'Ame Pécheresse;* the *Heptaméron,* a collection of tales in imitation of the *Decamerone of Boccaccio,* and first printed in 1559; and a collection of poems published in 1547 under the title of *Marguerites de la Mar-*

guerite des Princesses. She died, leaving one child, Jeanne d'Albret, afterward mother of Henry IV.

Margari'ta, an island belonging to Venezuela, in the Caribbean Sea; greatest length 37 mi.; greatest breadth about 20. Margarita was discovered by Columbus in 1498. Pop. 30,983.

Maria Louisa (1791–1847), second wife of Napoleon I; eldest daughter of the Emperor Francis I of Austria. Her marriage with Napoleon took place in 1810 after the divorce of Josephine, and in 1811 she bore him a son. After his overthrow she received in 1816 the duchies of Parma, Piacenza, and Guastalla, which she governed till her death. At Napoleon's death she made a morganatic marriage with her chamberlain, Count Neipperg.

Maria Theresa (1717–1780), queen of Hungary and Bohemia, archduchess of Austria, and empress of Germany, daughter of the Emperor Charles VI, was b. at Vienna, and in 1736 married Francis Stephen, grand-duke of Tuscany. On the death of her father in 1740 she ascended the throne of Hungary, Bohemia, and Austria, and a little later declared her husband joint ruler. Her accession was in accordance with the Pragmatic Sanction, but her claims were at once contested. Frederick the Great made himself master of Silesia; Spain and Naples gained possession of the Austrian territory in Italy; and the French, Bavarians, and Saxons marched into Bohemia, carrying all before them. Charles Albert was proclaimed archduke of Austria, and shortly after emperor of Germany; and the young queen fled to Pressberg, where she convoked the diet and threw herself upon the sympathy of her Hungarian subjects. The French and Bavarians were speedily driven from her hereditary states; Prussia made a secret peace with the queen, who unwillingly abandoned Silesia and Glatz to Frederick; and though by the treaty of Aix-la-Chapelle (1748) she was also compelled to give up the duchies of Parma, Piacenza, and Guastalla to Spain, her husband was elected emperor. During the time of peace which followed, Maria Theresa, with the aid of her husband and the minister Kaunitz, made great financial reforms; agriculture, manufactures, and commerce flourished, the national revenue greatly increased, and the burdens were diminished. The Seven Years' War again reduced Austria to a state of great exhaustion, but on its conclusion the empress renewed her efforts to promote the prosperity of her dominions. Her son Joseph was elected king of the Romans in 1674, and on the death of her husband, in 1765, she associated the young prince with herself in the government. In 1772 she joined in the dismemberment of Poland, obtaining Galicia and Lodomeria, while in 1777 she acquired Bukowina from the Porte, and in 1779, by the Peace of Teschen, gained the Inn valley. Of the sixteen children which she bore to the emperor ten survived her, one of whom was the unfortunate Marie Antoinette.

Marie Galante (gä-länt), an island in the West Indies, belonging to France, 5 leagues from Guadeloupe, of which it is a dependency. The chief productions are sugar, coffee, tobacco, indigo, and cotton. Pop. 15,017, chiefly negroes.

Marietta, county seat of Washington co., O., 125 m. s. e. of Columbus; at junction of the Ohio and Muskingum rivers, and on the B. & O., Southwestern, the Clev. & Marietta, the Janesville & Ohio River and the Toledo & Ohio Central Extension railroads. A bridge across the Ohio connects Marietta with Williamstown, W. Va. The city lies in a coal, iron and petroleum region and on account of its river trade is an important commercial center. It has extensive manufactures, including flour, lumber products, tanned leather, refined petroleum, oil-well tools, wooden bicycle rims, glass, harness and boats. Marietta, the first settlement within the present limits of Ohio, was founded in 1788. It is the seat of Marietta College, and has a city park set apart in 1788, and the oldest church and oldest building in the Northwest Territory, the latter having been the office of the Ohio Land Company. Pop. 1900, 13,348.

Marietta, county seat of Cobb co., Ga., 20 m. n.w. of Atlanta; on the Nash., Chatt. & St. L. R. R. It is in a farming and stock-raising district and has extensive marble works and chair factories. In the National Cemetery here, there are over 10,000 graves. Marietta was settled in 1832. Pop. 1900, 4,446.

Mariette, Auguste Edward (1811–1881), a distinguished French Egyptologist. He was attached to the Egyptian museum in Paris, and after successful scientific expeditions to Egypt he was appointed by the viceroy inspector general of monuments and curator of the museum at Boulak, with the title of Bey, and latterly of Pasha. He d. in 1881. His works were very numerous.

Mar'igold, a name of several composite plants. The common marigold is a native of France and of the more southern parts of Europe. It is an annual, from 1 to 2 ft. high, with large, deep yellow flowers. It is as prolific as any weed, and was formerly used in broths and soups, partly to give color, and partly as an aromatic seasoning. It had also many medicinal virtues assigned to it. A number of species of this genus are indigenous to the Cape of Good Hope. The so-called African marigold and French marigold, common in flower borders, are both Mexican species, and have brilliant flowers.

Marinette, Marinette co., Wis. Railroads: G. B. & M.; C. & N. W., and Milwaukee & Northern. Industries: There are many large saw mills turning out 1,500,000 ft. of lumber per day; also extensive iron works, paper, flour, and pulp mills. It is a lumbering district. Pop. 1900, 16,195.

Mario, Giuseppe (1808–1883), Marquis di Candia, a famous tenor, b. at Turin. In 1830 he became an officer in the Sardinian army, but to escape the punishment of some youthful freak threw up his commission and fled to Paris. There in 1838, under the assumed name of Mario, he accepted an appointment as first tenor of the opera, and a year later was secured

for the Théâtre Italien. For many years he divided his time between London, Paris, and St. Petersburg, and made two tours of the U. S.; the first in 1854, the second in 1872.

Marion, FRANCIS (1732–1795), Revolutionary soldier, was b. in Winyaw, S. C. His career as a partisan soldier was most brilliant. He entered the service as a captain, but was rapidly promoted till he became Brigadier-general. As commander of a troop of volunteer cavalry known as "Marion's Men," he became famous and rendered great service to the American cause. He was repeatedly elected to the Legislature of his native state.

Marion, county seat of Grant co., Ind., 65 m. n. e. of Indianapolis; on the Mississinewa river, and on the Clev., Cinn., Chi. & St. L., the Pitts., Cinn., Chi. & St. L., the Toledo, St. L. & Kan. C'y and the Cinn., Richmond & Muncie railroads. Electric lines connect Marion with Indianapolis and neighboring towns. The city lies in a rich agricultural region. The manufactures include window glass, fruit jars, bottles, bar iron, bedsteads, flour and linseed oil. It is the seat of the Marion Normal School and the National Soldiers' Home. Pop. 1900, 17,337.

Marion, Marion co., O., 45 mi. n. of Columbus. Railroads: Erie; C. S. & H.; and C. H. V. & T. Industries: iron foundries, flouring mills, carriage, steam shovel, mattress, rake, bicycle, and many other factories, and thresher and engine works. Limestone is plentiful and the quarries and lime kilns employ many. The town was first settled in 1820. Pop. 1900, 11,862.

Mariotte, EDME (1620–1684), a French mathematician and natural philosopher, b. in Burgundy, served as priest at St. Martin-sous-Beaune, and became member of the Academy of Sciences in 1666. He followed closely in the steps of Galileo and Torricelli, and made many important discoveries in hydrostatics and hydraulics.

Ma'rius, CAIUS (157–86 B.C.), a Roman general, born of obscure parents, at the village of Cereatæ, near Arpinum. He served with distinction at Numantia in 134 B. C. under Scipio Africanus; was tribune of the people in 119, and acquired much popularity by his opposition to the nobles. In 115 B.C. he was appointed prætor, and a year later proprætor of Spain, which he cleared of robbers; he also increased his influence by his marriage with Julia, the aunt of Julius Cæsar. In 109 B.C. he accompanied the Consul Q. Cæcilius Metellus as his lieutenant to the Jugurthine War. On the outbreak of the war against Mithridates, Marius, who had long been jealous of Sulla, endeavored to deprive him of his command, and in the struggle which followed was compelled to flee from Italy. After hairbreadth escapes he landed in Africa amid the ruins of Carthage, and remained there until recalled by Cinna, who had headed a successful movement in his favor. In company with Cinna he marched against Rome, which was obliged to yield, the entry of Marius and his followers being attended with the massacre of most of his chief opponents. On the completion of the term of Cinna's consulship he declared himself and Marius consuls (B.C. 86), but the latter d. seventeen days later at the age of seventy.

Marivaux (mȧ-rē-vō), PIERRE CARLET DE CHAMBLAIN DE (1688–1763), French dramatic writer and novelist, b. at Paris. After writing three or four novels and a series of articles of the *Spectator* type from 1720 onward he produced a large number of plays, the best being the *Surprise de l'Amour* (1722), the *Jeu de l'Amour et du Hazard* (1730), and *Les Fausses Confidences* (1737). They were characterized by a certain skillfully embroidered phrasing which gave rise to the term *marivaudage*, but they have also no little charm of feeling as well as of intellectual finesse.

Mar'joram, a genus of plants. The common marjoram, a native of Britain, is a perennial shrub, growing among copsewood in calcareous soils. The leaves are small and acute; the flowers reddish, in clustered spikes. Sweet marjoram is a biennial, cultivated in gardens. As soon as it blossoms it is cut and dried for culinary use, being employed as a seasoning.

Mark, ST., the Evangelist, according to the old ecclesiastical writers, the person known in the *Acts of the Apostles* as "John, whose surname was Mark" (Acts 12 : 12, 25) for many years the companion of Paul and Peter on their journeys. His mother, Mary, was generally in the train of Jesus, and Mark was himself present at a part of the events which he relates in his Gospel, and received his information partly from eye-witnesses. He was the cousin of Barnabas (Col. 4 : 10), and accompanied Paul and him to Antioch, Cyprus, and Perga in Pamphylia. He returned to Jerusalem, whence he afterward went to Cyprus, and thence to Rome. He was the cause of the memorable "sharp contention" between Paul and Barnabas. Of the close of his career nothing is known, and it is by no means certain even that the various passages, on which the church has based the biographical notes already cited, uniformly refer to the same individual.

Mark Antony. See *Antony.*

Markham, CHARLES EDWIN (1852——) American poet and educator, born in Oregon City, Ore., 1852. He spent his boyhood on a cattle ranch in California, attending country schools whenever he could. In 1871, he entered the San Jose State Normal. Afterward he graduated from the Christian College, Santa Rosa. Since graduation he has been a prominent California educator, and has rendered especially valuable service as head master of the Tompkins Observation School at Oakland. For several years he has contributed poems to American magazines, but came into prominence at the publication of *The Man with the Hoe*, in 1899. Since then he has lectured widely on existing social problems and has written articles on the same subjects.

Markham, CLEMENTS ROBERT (1830–), English geographer and traveler. In 1860–61 he visited Peru and India in connection with the establishment of cinchona plantations in

the latter country, one result being the publication of *Travels in Peru and India* (1862). In 1865–66 he visited Ceylon and India, and in 1867–68 accompanied the Abyssinian expedition, an account of which he wrote. Other works of his are: *Life of the Great Lord Fairfax; Sketch of the History of Persia; Peruvian Bark; The War between Peru and Chile;* etc.

Marks, Henry Stacy, English artist, was b. in London in 1829. He studied in Paris at the Royal Academy. His first picture appeared in 1853 at the Royal Academy. His portrayal of bird life is unequaled.

Marl, an earthy substance essentially composed of carbonate of lime and clay in various proportions. In some marls the argillaceous ingredient is comparatively small, while in others it abounds, and furnishes the predominant characters. The most general use of marl is to improve soils. The fertility of any soil depends in a great degree on the suitable proportion of the earths which it contains; and whether a calcareous or an argillaceous marl will be more suitable to a given soil may be determined with much probability by its tenacity or looseness, moisture or dryness. The quicker action and greater efficiency of slaked lime have in many districts led to its substitution for marl.

Marlborough, Middlesex co., Mass., 30 mi. w. of Boston. Surrounding country agricultural. Railroads: N. Y.; N. H. & H.; and Fitchburg. Industries; large horseshoeing establishment, iron foundries, machine shops, and shoe factories. The town was first settled in 1660 and became a city in 1890. Pop. 1900, 13,609.

Marlborough, a provincial district, New Zealand, occupying the northeast portion of South Island, and bounded by the sea and the provincial district of Nelson. Its extreme length is 130 mi., breadth 60 mi.; area about 3,000,000 acres. In the south of the district are the Wairau Plains, one of the finest sheep tracts in New Zealand. Capital, Picton, situated on an arm of Queen Charlotte Sound. Pop. 11,113.

Marlborough, John Churchill, Duke of (1650–1722), English general and statesman, second son of Sir Winston Churchill; b. at Ashe, in Devonshire. He first gained renown at the siege of Maestricht where he distinguished himself so highly as to obtain the public thanks of the king of France. On his return to England he was made lieutenant colonel, and through the influence of his sister Arabella, mistress of the Duke of York, his advancement was rapid. He had a regiment of dragoons presented to him, and strengthened his influence at court by his marriage with Sarah Jennings, an attendant upon the princess, afterward Queen Anne. In 1691 he was suddenly dismissed from all his employments and committed to the Tower on the charge of high treason, but soon obtained his release: though it appears that the suspicions against him were not without foundation. On the death of Queen Mary he was made a privy councillor, and appointed governor to the young Duke of Gloucester; and in 1701 was created by King William commander in chief of the English forces in Holland, and also ambassador plenipotentiary to the states general. In the campaign of the year 1702 he drove the French out of Spanish Guelders, and took Liége and other towns, for which he was created Duke of Marlborough. In 1704 he stormed the French and Bavarian lines at Donauwörth, and in the same year, in conjunction with Prince Eugene, gained the victory of Blenheim over the French and Bavarians, headed by Marshal Tallard and the Elector of Bavaria. The nation testified its gratitude by the gifts of the honor of Woodstock and hundred of Wotton, and erected Blenheim Palace for him, one of the finest seats in the kingdom. On the victory of Ramillies, 1706, a bill was passed to settle his honors upon the male and female issue of his daughters. In the campaign of 1707 his antagonist was the famous Duke de Vendôme, over whom he gained no advantage, and on his return, found that his popularity at court was on the decline. In 1708, in conjunction with Prince Eugene, he gained the battle of Oudenarde. In 1709 he defeated Marshal Villars at Malplaquet, though at a cost ill repaid by the capture of Mons. On the next visit of the duke to England he found that the duchess, by her great arrogance, had so disgusted the queen that a total breach had ensued. Early in 1710 he returned to the army, and with Prince Eugene gained another victory over Villars. During his absence a new ministry, hostile to himself, was chosen, and on his return his command was taken from him, and a prosecution commenced against him for applying the public money to private purposes. He repaired in disgust to the Low Countries in 1712, but returned a short time before the queen's death, and on the accession of George I was reinstated in the supreme military command. Retiring from all public employments, his mental faculties gradually decayed, and he died at Windsor Lodge leaving four daughters. The title fell to the descendants of one of his daughters, who have assumed the name of Churchill.

Marlowe, Christopher (1564–1593), an English poet and dramatist, b. at Canterbury. He settled in London, and became an actor as well as a writer for the stage. Besides six tragedies of his own composition, the best known of which are *Tamburlaine the Great, Edward II, Doctor Faustus,* and the *Jew of Malta,* he left a translation of the *Rape of Helen,* by Coluthus; some of Ovid's *Elegies;* the first book of Lucan's *Pharsalia;* and the *Hero and Leander of Musæus,* completed by George Chapman. Marlowe was by far the greatest dramatic writer before Shakespeare.

Marlowe, Julia (1870——); Mrs. Julia Marlowe Tabor, an American actress. B. at Caldbeck, Cumberlandshire, Eng., Aug. 17, 1870. When she was five years of age her parents removed to the United States, where she has since resided. She was educated in the public schools and began her career on the stage in her 12th year, when she joined a juve-

nile opera company and took parts in Pinafore, The Chimes of Normandy, and other light operas. She was christened Sarah Frances Frost, but was known as Frances Brough during her connection with the juvenile company. She later played a child's part in Rip Van Winkle, and the next year took small parts in classic dramas in the Western States. She then retired from the stage and studied for three years in New York. On re-entering theatrical life Miss Marlowe made her debut as Parthenia in Ingomar. Since 1888 she has starred in Shakesperean and other roles in the United States. She married Mr Robert Tabor, for several seasons the leading man in her company. Her home is in New York City. Pl. 26, Vol. III.

Marmont (mär-mōn), Auguste Frédéric Louis Viesse de (1774–1852), duke of Ragusa and marshal of France, entered the army as a lieutenant of infantry in his fifteenth year. In 1792 he changed to the artillery, and at Toulon became acquainted with Bonaparte, who chose him for his aid-de-camp. In Italy he greatly distinguished himself, and after the battle of Marengo attained the rank of general of division. He was present at Wagram, and after the truce of Znaim was made field marshal. In conjunction with Soult he raised the siege of Bajadoz, but was ultimately badly beaten at Salamanca by Wellington. In 1814 he fought a final battle under the walls of Paris, but opposition appearing fruitless he surrendered to the allies. This proceeding was one main cause of Napoleon's immediate abdication, and brought Marmont into favor with the Bourbons. After the Restoration Louis XVIII made him a peer of France, but he was compelled to withdraw from Paris by the revolution of 1830, and his name was struck off the army list. He accompanied Charles X in his exile, and afterward traveled, publishing the results of his travels in 1837–39. He also wrote *Esprit des Institutions Militaires* and his own memoirs. He died at Venice.

Mar'mora (or Marmara), Sea of (anciently *Propontis*), an inland sea, lying between European and Asiatic Turkey, communicating with the Mediterranean by the Dardanelles, and with the Black Sea by the Bosporus; length from Gallipoli to the head of the Gulf of Izmid, 177 mi.; greatest breadth rather more than 50 mi. It contains several islands, of which the largest is Marmora, famous for its quarries of marble and alabaster.

Mar'moset, a name of several small South American monkeys, the smallest of the monkey tribe. They are agile in their movements, possess long, non-prehensile tails, and have a thick, woolly fur. They bear a close resemblance to squirrels in general appearance, feed upon fruit and insects, and occasionally upon the smaller birds and their eggs.

Marmot, a rodent quadruped, classed with the squirrels. They are thick bodied, have short tails and short legs, and live in burrows, which are generally excavated in mountainous situations, and consist of galleries in which whole communities reside. During the winter they lie dormant. The marmots inhabit Europe, Northern Asia, and North America. The prairie dog or prairie marmot, or wistonwish, of North America, is the most familiar species. Another species found in America is the woodchuck of the middle states.

The Alpine Marmot.

Marne (märn) (Latin, *Matrŏna*), a river of France, the largest tributary of the Seine on the right, rises in the department of Haute-Marne, and enters the Seine about 3 mi. above Paris. It has a course of about 280 mi., of which 210 mi. are navigable.

Marne, a department of France, bounded by Ardennes, Aisne, Seine-et-Marne, Aube, Haute-Marne, and Meuse; 67 mi. long by 60 mi. broad; area 3,158 sq. mi. About two thirds of it is arable, and the crops, chiefly rye and oats, more than supply the consumption. The vine is largely cultivated; but though the champagnes of Rheims and Epernay are famous the general produce of the vineyards is indifferent. Châlons-sur-Marne is the capital. Pop. 434,692.

Marne, Haute (Upper Marne), a department of France, bounded by Meuse, Marne, Aube, Côte d'Or, Haute-Saône, and Vosges; area 2,401 sq. mi. The principal rivers are the Marne, with its tributaries, and the Meuse. The ordinary agricultural crops equal the consumption, and the wine is partially exported. The forests are extensive, and furnish fuel for smelting the ironstone of the department. The coal measures are partially developed, but the prevailing rock is Jura limestone. Chaumont is the capital. Pop. 243,533.

Maroons', the name given to runaway negroes in Jamaica and in some parts of South America. In many cases they rendered themselves formidable to the colonists. When Jamaica was conquered by the English in 1655 about 1,500 slaves retreated to the mountains, and continued to harass the island till 1795, when they were reduced by the aid of bloodhounds.

Marque, Letters of (or Letters of Marque and Reprisal), a license or extraordinary commission granted by a sovereign or the supreme power of one state to the citizens of this state to make reprisals at sea on the subjects of another, under pretense of indemnification for injuries received; that is, a license to engage in privateering. Letters of marque were abol-

ished among European nations by the Treaty of Paris of 1856. The U. S. were invited to accede to this agreement, but declined.

Marquesas (mär-kā'sàs), an island group in the South Pacific Ocean, lat. 8° to 11° s.; lon. 138° 30′ to 143° w., belonging to France, composed of twelve islands and islets. Their principal productions are yams, breadfruit, and cocoanuts. Hogs are numerous, and cattle have been introduced. The men are well formed and powerful, generally tattooed; the women are the finest of the sex in Polynesia. The people were formerly cannibals. Pop. about 6,000.

Marquette, county seat of Marquette co., Mich., on Lake Superior, and on the D. S. S. & A. railroad, 425 m. n. of Chicago. It has a good harbor and is an important shipping point. Industries: iron mines, brown-stone quarries, blast furnaces, rolling mills, foundries and great lumber industries. It is the seat of a state normal school. Pop. 1900, 10,058.

Marquette, JACQUES (1637-75), a French Jesuit missionary in America. He came to Canada in 1666, founded Sault St. Marie in 1668, and in 1673 accompanied Joliet upon his mission to the Mississippi. Marquette later founded a mission among the Illinois Indians. He died in upper Michigan, and was buried at St. Ignace. His influence among Indians was strong. Wisconsin has placed his statue in the Congressional Library at Washington.

Marriage, a solemn contract between a man and a woman, by which they are united for life and assume the legal relation of husband and wife. Different localities have different forms of the institution, the most broadly marked of which are connected with the right to have only one wife, *monogamy*, or a plurality of wives, *polygamy*. Marriage is now commonly regarded as a civil contract and is held to be valid only when both parties are able and willing to contract according to certain established forms. In the Roman Catholic Church marriage is considered a sacrament. The church does not, however, deny the validity of marriage as a civil contract, but does deny its benediction in the case of mixed marriages, such as the union of a Catholic with one of a different religion.

The laws in relation to marriage in the U. S. are founded mainly on the laws of England. The different states have all different statutes on the subject; but there is a consensus of intent in the legislation of every state, that no specific form in marriage is necessary if the consent of the parties is proved. The institution of marriage, however, differs so far from a contract in its essence that it cannot be modified or dissolved by consent alone, nor, except in rare cases, rescinded in consequence of any proof of fraud. The old common law marriage of England, to wit, declared intention and acknowledgment in connection with cohabitation, is good in nearly every state in the Union. In some states there are statutory provisions with regard to obtaining a license, while other states have no legislation on the subject. An old statute in Pennsylvania provides that a marriage shall be solemnized before twelve witnesses. Until recently, the courts of each state recognized as valid a marriage contracted in any other state; but latterly the courts of a number of states have refused to recognize the validity of marriages in some others. Males of fourteen and females of twelve, not subject to any physical or mental incapacity, are proper subjects for marriage in England; but for the marriage of a minor the consent of parents or guardians must be previously obtained. In this country each state fixes the age of consent, and there is no uniformity of legislation in this respect. A

Mars, the Roman god of war, at an early period identified with the Greek *Arēs*, a deity of similar attributes. Like Jupiter he was designated *father*, and was regarded in particular as the father of the Roman people, Romulus and Remus being the fruit of his intercourse with Rhea Silvia. Several temples at Rome were dedicated to him. His service was celebrated not only by particular *flamines* devoted to him, but by the College of the Salii, or priests of Mars. The month of March, the first month of the Roman year, was sacred to him. As the tutelary deity of Rome he was called *Quirinus;* in his character as the god of war *Gradīvus* (the striding). Ares, the Greek god of war, was the son of Zeus (Jupiter) and Hera (Juno). He is represented as terrible in battle, but not as invulnerable, since he was wounded at various times by Hercules, Diomedes, and Athena. He is represented as a youthful warrior of strong frame, either naked or clothed with the chlamys.

Mars, of the superior planets, that which lies nearest the sun, or next beyond the orbit of the earth. He moves round the sun in 686.9797 of our mean solar days, at the average distance of 139,312,000 mi., his greatest and least distances being 152,284,000 and 126,340,000 mi.; his orbit is inclined to the ecliptic at an angle of 1° 51′ 5″; his distance from the earth varies from about 35,000,000 to 244,000,000 mi.; he rotates on his axis in 24 hours 37 minutes and 22 seconds: the inclination of his axis, or the angle between his equator and his orbit, is 28°; his diameter is about 4,400 mi. His surface resembles that of the earth; but the seas, as the parts which have a greenish tinge are thought to be, cover a much smaller area than the reddish parts or land. The reddish hue of Mars is one of his characteristic features. About every 8 years 7 months he is in perihelion and perigee at the same time, and has a wonderful brilliancy. At his poles are white portions, which decrease and increase in size at the beginning and end of the Martial summer, so that the poles are supposed to be surrounded with snow. In 1877 two satellites, both very small bodies, were discovered by Professor Hall of the Naval Observatory, Washington. The outer one, 14,500 mi. distant from the center of Mars, revolves round the planet in a period of 30 hours 14 minutes; the inner one, 5,800 mi. from the center of Mars, has a period of 7 hours 38 min.

Marseillaise Hymn (mär-se-lāz'), the war-song of the French Republic. The words, and, as is generally believed, the music, were written in 1792 by Rouget de l'Isle, an officer in garrison at Strasburg, on the occasion of a body of volunteers leaving that city for the war against Austria and Prussia, and the poem was entitled by him *Chant de Guerre de l'Armée du Rhin* (*War-song of the Army of the Rhine*). It was called Marseillaise because first sung in Paris by volunteers from Marseilles.

Marseilles, (French Marseille) (mär-sālz', mär-sā-yé) (Latin, *Massilia*), a city and the principal commercial seaport of France, on the Mediterranean, capital of the department of Bouches-du-Rhône. It is situated on the northeastern shore of the Gulf of Lyons, and lies in the form of an amphitheater round a natural harbor of moderate size now known as the Old Harbor. In recent times Marseilles has made great progress in its extent, street improvements, population, and commerce, largely owing to the conquest of Algeria and the opening of the Suez Canal. The most important manufactures are soap, soda, and other chemical products; also olive and other oils, sugar, machinery, iron and brass work, candles, glass, earthenware, etc. The trade is chiefly in soap, olive oil, wine, brandy, corn, flour, dried fruits, tobacco, wool, skins, iron, cotton, etc. Marseilles was founded by a colony of Greeks from Asia Minor about 600 years B. C. the original name being Massalia. It was taken by Cæsar in 49 B. C. On the decline of the Roman Empire it became a prey to the Goths, Burgundians, and Franks. In 735 it fell into the hands of the Saracens, and in the tenth century it came under the dominion of the counts of Provence, and for some centuries after followed the fortunes of that house. Pop. 403,749.

Marsh, GEORGE PERKINS (1801–1882), American scholar and diplomatist. He graduated at Dartmouth College, studied law, and practised at the bar. In 1842–49 he was a member of Congress, and in 1851 American minister at Constantinople. From 1861 till his death in 1882 he was American minister to Italy.

Marsh, OTHNIEL C., naturalist, b. in Lockport, N. Y., in 1831. He has devoted himself to the investigation of extinct vertebrate animals. Since 1883 he has been president of National Academy of Sciences.

Marshal (French, Maréchal), a word of German origin signifying originally a man appointed to take care of horses. A similar term is the French *connétable*, or constable. The marshal of the German Empire derived his origin from the Frankish monarchs. He had to superintend the ceremonies at the coronation of the emperor, and on other high occasions. There is still a marshal at the head of the households of German sovereigns. In France *maréchal de France* is the highest military honor. In Germany *general field marshal* is the highest military honor. In the U. S. a marshal is an executive officer (resembling the sheriff) connected with the U. S. courts.

Marshall, JOHN (1755–1835), jurist, b. in Germantown, Va. At the age of forty-one he was at the head of the Virginia bar, and in the branches of international and public law had no superior in the country. As chief justice of the Supreme Court of the U. S. his decisions are regarded as the standard authority on constitutional questions.

Marshall, Harrison co., Tex. Railroads: Texas & Pacific; and Paris, Marshall, and Sabine. Industries: plow, cotton gin, and ice factories, foundry and car works, saw and planing mills, cotton compress, also railroad car shops. Cotton is grown in the vicinity. It is in a timber district. Pop. 1900, 7,855.

Marshalltown, Marshall co., Ia., 50 mi. n.e. of Des Moines. Railroads: Iowa Central; C. & N. W.; and C. St. P. & K. C. Industries: engine, furniture, machinery, and linseed oil works, and large pork-packing establishments. It is shipping center for the surrounding wheat district, and is the seat of the Iowa Soldiers' Home. Pop. 1900, 11,544.

Marsh Mallow, common European plant, growing in marshes, especially near the sea, in great abundance. It is employed medically as a demulcent: and is the *guimauve* of the French, used in the preparation of demulcent lozenges. It is perennial, and has a white, fleshy, carrot-shaped root, which may be used as food. The stem is from 2 to 3 ft. high, both leaves and stem being covered with a soft down. The flowers are flesh-colored. The hollyhock is another species.

Common Marsh Mallow. *a*.—a flower; *b*.—fruit.

Marston, JOHN (about 1570–1633), an English dramatic author, of the reigns of Elizabeth and James I. He was the author of eight plays, all acted at the Black Friars Theater with applause. Six of these were printed in one volume in 1633, and dedicated to the Viscountess Falkland. He assisted Ben Jonson and Chapman in the composition of *Eastward Ho*. He also wrote three books of satires, entitled the *Scourge of Villainy* (1599.)

Marston, WESTLAND (1820–1890), English poet and dramatist, b. at Boston. He went to London to study law, but devoted himself to literature, his first tragedy, *The Patrician's Daughter*, being produced at Drury Lane in 1842 by Macready, Phelps, and Helen Faucit. Of his many subsequent plays (collected in two volumes in 1876) the best known are *Strath-*

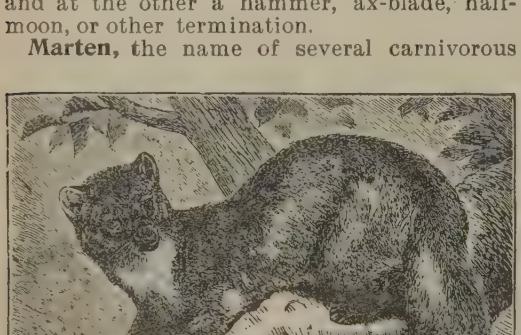
more, *Ann Blake*, and *Life for Life*. He is also the author of several lyrical compositions, some short stories collected in 1861 under the title of *Family Credit*, and a novel, *A Lady in her own Right*, published in 1860.

Marston Moor, in Yorkshire, about 7 mi. w. of York, a locality celebrated for the battle between the royal forces under Prince Rupert and the troops of the Parliament under Fairfax and Cromwell (July 2, 1644), in which the latter were victorious.

Marsupia'lia, (or Marsu'pials) (L. *marsupium*, a pouch), an extensive group of mammalia, differing from all others in their organization, and including genera which correspond to several orders of ordinary mammals. They belong to the aplacental mammals, and their most striking peculiarity is the production of the young in an immature state, a feature which renders necessary the pouch in which the immature young are placed immediately on their birth. In this pouch are the mammæ or teats, and sheltered here the imperfect young ones, attached to the nipple by the mouth, remain until fully developed. The marsupials link the mammals through the Monotremata (which see), to the birds and reptiles. There are many genera both herbivorous and carnivorous, the great bulk of them being confined to the Australian region. The kangaroo and opossum are familiar examples. The Marsupialia are divided into the following sections: *Rhizophăga* (root eaters), including the rodent like wombat; *Poephăga* (grass eaters), including the kangaroos and the kangaroo rats or potoroos, all strictly plant eaters; the *Carpophăga* (fruit eaters), of which the typical group is the phalangers, the best known being the Australian opossum; the *Entomophăga* (insect eaters), in which are the American or true opossum, the bandicoot, and the banded ant eater; *Sarcophăga* (flesh eaters), of which the best known are the "Tasmanian wolf" and "Tasmanian devil."

Martel-de-fer, an ancient weapon having a kind of cross-head forming at one end a pick, and at the other a hammer, ax-blade, half-moon, or other termination.

Marten, the name of several carnivorous



The Pine Marten.

quadrupeds. The body of the marten, like that of the weasel, is elongated and slender. The legs are short, the feet being provided with five toes, armed with sharp claws. In habit the martens differ from the weasels in being arboreal, these forms climbing trees with great ease. The pine marten occurs chiefly in North America and in the northern parts of Asia. It is of smaller size than the common marten, possesses a yellowish mark on the throat, and has a finer fur largely used for trimmings. It burrows in the ground. The famous sable marten which furnishes the valuable sable fur, is nearly allied to the pine marten. It inhabits Siberia. Pennant's marten, or the *fisher*, as it is popularly called, is another well-known species.

Martha's Vineyard, the principal island of Dukes co., Mass., 12 mi. w.n.w. of Nantucket, 19 mi. long, and from 2 to 10 broad. In contains several towns and seaside resorts.

Martial, in full Marcus Valerius Martialis (43–104 A. D.), Roman writer of epigrams, was b. at Bilbilis, in Spain, He went to Rome when young, during the reign of Nero, and lived under Galba and the following emperors. Domitian gave him the rank of tribune, and the rights of the equestrian order. In 100 A.D. he returned to Spain to his native city, where he died. His celebrity is founded on fourteen books of epigrams, which for the most part depict with no less good sense than pungent wit the life of imperial Rome.

Martial Law, the law by which the discipline of an army is maintained, applying only to persons in actual military service, and only to their conduct in such service. The jurisdiction under the law martial is in a distinct tribunal, known as a court-martial, appointed by some superior officer. Under special circumstances of insurrection or rebellion, where the ordinary law is insufficient to protect life and property, it is sometimes necessary to administer the law according to the practise of military courts, by an armed force occupying the disturbed district. The district is then said to be under martial law.

Martin, John (1789–1854), English historical and landscape painter, b. at Haydon, near Hexham. He was apprenticed to a coachmaker in Newcastle, to learn heraldic painting, and removed in 1806 to London, supporting himself there by painting on glass and china. His first picture entitled *Sadak in Search of the Waters of Oblivion*, was exhibited in 1812. This was followed by *Paradise, The Expulsion From Paradise, Clytie*, and *Joshua Commanding the Sun and Moon to Stand Still* (1816). *The Fall of Babylon* (1819) excited great attention, and *Belshazzar's Feast* (1821) obtained the prize of $1,000 at the British Institution.

Martin, St., one of the Leeward Islands, West Indies, between the islands of Anguilla and St. Bartholomew, belonging partly to the French and partly to the Dutch; area 30 sq. mi. From the salt water lagoons in the south quantities of salt are obtained. The climate is considered healthy. Nearly all the inhabitants are English. Pop. 6,600.

Martin's Ferry, Belmont co., O., on the Ohio River. Railroads: C. L. & W.; W. B. &

T.; and Cleveland & Pittsburg. Industries: Glass, stove, machine, and engine works, blast furnace and stove works. Kegs and barrels are also made. There are large deposits of coal in the vicinity. Pop. 1900, 7,760.

Martineau (mär ti-nō), HARRIET (1802–1876), English authoress of French Huguenot descent, b. at Norwich. In 1834 Miss Martineau visited the U. S., after returning from which she published *Society in America*, and *A Retrospect of Western Travel*. In 1839 and 1840 appeared *Deerbrook* and *The Hour and the Man*, two novels, the first of which especially acquired a wide popularity. In 1848 she issued *Eastern Life, Past and Present*, the result of a visit made by her to the East in 1846. Among her other works of importance may be mentioned her *History of England During the Thirty Years' Peace*.

In May, 1902, this little island became the scene of one of the greatest catastrophes of modern times. St. Pierre, situated a few miles from the base of Mt. Pelee, was the commercial center of the island and had a population of 25,000. In April, Mt. Pelee began to show symptoms of activity. Clouds of smoke rested upon the summit, the temperature rose several degrees, and columns of smoke and clouds continued to increase in frequency. On May 5th, loud detonations were heard and a tremor shook the mountain and city, while a mass of mud was thrown from the old crater. Still the governor and other influential citizens looked upon this as a mere eruption instead of a harbinger of destruction. On May 8, at about 7:50 a. m., the great shock of the eruption came. Within ten minutes St. Pierre and the small surrounding towns were in ruins

Martinique (Mar-ti-neek'), one of the French West India Islands belonging to the Windward group, 30 miles south by west of Dominico, 110 miles north of St. Vincent and about 450 miles southwest of Porto Rico. The island is 45 miles long and 10 to 15 miles wide, and has an area of 380 square miles. The form is irregular and the coasts are rugged, while the surface is rough and mountainous, culminating in Mt. Pelee, which has an altitude of 4,500 feet. Like the other islands of the group, Martinique is of volcanic origin. The climate is humid, but not unhealthful. The principal products are sugar cane, coffee, cocoa and tropical fruits. The population in 1902 was 203,781. St. Pierre and Fort du France, formerly Port Royal, are the important towns.

Martinique was discovered by the Spaniards on St. Martin's day, 1493. In 1635 it was settled by the French.

and more than 30,000 people had perished. There were at the time eighteen vessels in the harbor and only one escaped destruction. This was the British steamship *Roddam*, in charge of Capt. Freeman. When relief parties landed not a living thing was found.

The observation of relief parties and opinions of scientists resulting from later examinations of this scene are to the effect that St. Pierre and its inhabitants were destroyed by a rain of fire and poisonous gases which caused instant death. The city was neither embedded in lava nor buried in ashes as were Pompeii and Herculaneum (which see) two thousand years before; but all the buildings were burned and most of the bodies were charred. In this respect the eruption of Mt. Pelee seems to differ from all others on record.

On May 20th, another eruption more violent than the first occurred and several hundred

more lost their lives. Several eruptions occurred in July, those on the 10th and 11th being especially violent. From the middle of August to the middle of September, the volcano was in a state of activity. An outbreak near the end of August was considered by some to be more violent even than that which destroyed St. Pierre. It is estimated that, directly and indirectly, over 40,000 people met death in the eruption of this mountain, and this is considered the greatest catastrophe wrought by any volcano known to mankind.

Mt. Soufriere, on the island of St. Vincent, about 100 m. s. of Martinique, also became active on May 8th and caused considerable damage and loss of life, though the eruption was not so violent as that of Mt. Pelee. This volcano also continued active through August.

These sudden and violent eruptions are thought by some geologists to be connected with the earthquake and other volcanic phenomena that disturbed various sections of the earth during the spring of 1902. Destructive earthquakes occurred in Russia and in Mexico, and these were followed by similar, though less violent, disturbances in Guatemala. It is considered quite probable that the seismic disturbances in Central America were connected with the eruption of these volcanoes. The earthquakes in Mexico and Central America were of the far-reaching type, and the disturbance caused by them was recorded in Baldwin, Kansas, Baltimore, Maryland, and Toronto, Canada. The violent eruptions of Mounts Pelee and Soufriere have awakened new interest in the study of volcanic phenomena. Noted scientists repaired to Mount Pelee at the earliest practicable date, and many new and important facts bearing upon volcanic eruptions have been obtained as a result of their observations.

Martinsburg, Berkeley co., W. Va. Railroads. B. & O., and Cumberland Valley. Industries: flour and woolen mills, lime and furniture factories, and railroad repair shops. Pop. 1900, 7,564.

Martius, Karl Friedrich Philipp von (1794–1868), a German traveler and naturalist. After taking the degree of Doctor of Medicine at Erlangen, he joined Spix in the scientific expedition to Brazil, set on foot by the Austrian and Bavarian governments (1817–20). He is the author of a large number of botanical works, but is chiefly known through those arising out of his journey to Brazil — *Reise nach Brasilien* (1824–31); *Historia Naturalis Palmarum* (1823–45); and *Flora Brasiliensis* (1840–71), the last two of which are among the most remarkable in botanical literature.

Martyrs (Greek for "witnesses"), a name applied by the Christian church to those persons in particular, who in the early ages of Christianity, and during the great persecutions, suffered ignominy and death rather than renounce their faith. Festivals in honor of the martyrs seem to have been observed as early as the second century. The Christians offered prayers at the tombs of the martyrs, and thanked God for the example which they had given to the world. The rite was concluded with the sacrament of the Lord's Supper and the distribution of alms. Eulogies were also delivered, and accounts of the lives and actions of the deceased read.

Maruts, in Hindu mythology, the gods or genii of the winds.

Marvell, Andrew (1620–1678), a political and miscellaneous writer, b. at Hull. In 1635 he was sent to Trinity College, Cambridge. On the death of his father in 1640 he made the tour of Europe; afterward was appointed assistant to Milton in his office of Latin secretary. In 1660 he was chosen member of Parliament for his native place, which he represented so honorably to the end of his life that he gained the name of the "English Aristides." Besides a small handful of finely musical poems he composed much humorous and satirical verse; his poems were edited by James Russell Lowell in 1857.

Marx, Karl (1818–1883), German socialist, studied law and philosophy at Berlin. After editing the *Rheinische Zeitung* at Cologne from 1841 till its suppression, he went in 1844 to Paris, where he took part in the publication of the *Deutsch-Französische Jahrbücher*, and a newspaper, *Vorwärts*. Being compelled to flee to Brussels, he there in 1848 became head of the central committee of the socialists. In 1864 he established the *International*, but after the disruption in 1872, when he led the extreme party, he removed from London to New York. His chief work, the Bible of one group of socialists, was *Das Kapital*, (1867).

Mary, The Virgin, the mother of Jesus, according to tradition embodied in the apocryphal gospels the daughter of Joachim and Anna. The story of her life so far as it is given in the New Testament begins with her betrothal to Joseph, and the narrative of the birth of Christ. She is thrice mentioned during Christ's public ministry, and once after his death. A tradition asserts that she lived and died at Jerusalem under the care of John; another that she died at Ephesus, to which she and John had retired from the siege of Jerusalem. In the earliest age of the Christian Church the immaculate conception of the Virgin was believed, but with Catholics it was not made an article of faith until Dec. 8, 1854. The Ave Maria, a prayer in which is invoked her intercession, from this time became second only to the Lord's Prayer in frequency of use. See *Madonna*.

Mary I (1516–1558), queen of England, daughter of Henry VIII by Catherine of Aragon. She ascended the throne in 1553, after an abortive attempt to set her aside in favor of Lady Jane Grey. One of her first measures was the reinstatement of the Roman Catholic prelates who had been superseded in the late reign. Her marriage to Philip II of Spain, united as it was with a complete restoration of the Catholic worship, produced much discontent. Under Philip's influence a war began with France, which ended in the loss of Calais in 1558, after it had been in the hands of the English for above 200 years.

Mary II (1662–1694), queen of England, was daughter of James, duke of York, afterward James II, by his wife Anne Hyde daughter of Lord Clarendon. She was married in 1677 to William, prince of Orange: and when the Revolution dethroned her father, Mary was declared joint possessor of the throne with William, on whom all the administration of the government devolved.

Maryland, the *Old Line State,* one of the South Atlantic States and the first of the original thirteen to adopt the Constitution; bounded on the n. by Pennsylvania, on the e. by Delaware and the Atlantic ocean, on the s. and s. w. by Virginia and West Virginia, from both of which it is separated by the Potomac river, and on the w. by West Virginia. Its extreme length from e. to w. is 190 m., and its greatest breadth about 120 m. The outline of the state is very irregular. Area, not including Chesapeake Bay, 9,860 sq. m.; with the bay, 12,210 sq. m. Population 1900, 1,190,050, of which 256,620 are colored.

Surface.—That portion of the state lying between Chesapeake and Delaware bays and the Atlantic is low and in some localities swampy. The western portion is crossed by the Blue Ridge, the central Appalachian and the Alleghany mountains. The highest peaks in these mountains reach altitudes of 2,500 and 3,000 feet. The ranges are nearly parallel, and are separated by deep valleys. That portion lying between the mountains and Chesapeake bay is rolling and hilly. Alleghany county, in the northwestern portion, is noted for its beautiful scenery. The Potomac is the largest river. The other streams, wholly within the state, are short and small, except at their mouths, where many of them have estuaries. Flowing into the bay on the w. are the Patuxent, Patapsco, Gunpowder and Susquehanna; on the e. are the Elk, Sassafras, Chester, Choptank and several others. The Monocacy, Antietam and Youghiogheny empty into the Potomac.

Climate.—The climate is mild and healthful. The mean summer temperature is 75°, and the mean winter temperature 34°. No section is free from snow, and cold waves of short duration occur during the winter months. The average annual rainfall in the western portion is 38 in. and near the Atlantic coast, 46 in.

Mining.—Coal occurs in large quantities in the northwestern portion of the state, the veins being from one to fourteen feet in thickness. The annual output exceeds 5,000,000 tons. Iron, copper, limestone and marble occur in limited quantities in the vicinity of Baltimore. Among other valuable minerals are chrome, potter's brick, porcelain clays and hydraulic cement.

Agriculture.—The northern part of the state is well suited to the growing of wheat, corn and grass, and is also noted for its extensive peach orchards. Dairy farming and raising of live stock are important industries in this region. Southern Maryland is especially adapted to the raising of vegetables and truck farming. Tobacco is the most important crop.

Fisheries.—The oyster beds of Chesapeake Bay are famed for their size and the excellent quality of their product. Oyster fishing is one of the important industries of the state. The area of the beds exceeds 200 sq. m., and during the season over 7,000 small vessels are employed in dredging, scraping and tonging for oysters. The output of canned oysters for 1900 was valued at $2,417,000, while the value of those sold in bulk was equally great. Shad, menhaden, mackerel and crabs are also taken in large quantities.

Manufactures.—Maryland is not essentially a manufacturing state, but all lines of manufacture have advanced since 1890, and in 1900 the state contained 9,879 establishments, giving employment to an average of 108,325 wage earners, and producing an annual output valued at $242,502,990. The leading industries are the manufacture of men's clothing, canning and preserving fruits and vegetables, the manufacture of foundry and machine shop products, flouring and gristmill products and tobacco; slaughtering and meat-packing are also important. Most of the large manufactories are in or near of Baltimore.

Transportation.—While the Atlantic coast affords no good harbors, the indentations along the coast of Chesapeake Bay form many excellent harbors for vessels of light draft, and that of Baltimore is open to the largest ocean steamers. The Potomac is navigable as far as Washington, 125 miles. The Baltimore & Ohio, the oldest railway in the country, has lines connecting Baltimore with Philadelphia and Washington and also with the Ohio valley. The Pennsylvania system, Western Maryland and Baltimore & Lehigh traverse the state in various directions. The Chesapeake and Ohio Canal extends from Georgetown, D. C., to Cumberland and is an important waterway.

Education.—The public school system dates from 1694, when the Assembly, under the influence of Governor Nicholson, founded the King William School and provided revenue for its support. This afterwards became St. John's College and is still in a flourishing condition. The public schools are supported by state and local taxation, and separate schools are provided for white and colored children. The leading educational institution is Johns Hopkins University, at Baltimore, founded in 1876. The other important colleges are Baltimore City College, Baltimore; Loyola College, Baltimore; Rock Hill College, and St. Charles College, Ellicott City; Windsor Female College and Peabody Institute. There are numerous charitable, correctional and penal institutions, all of which have a liberal support.

History.—Maryland was first settled in 1634 by the English under Leonard Calvert, a brother of Lord Baltimore, of England. The early history was greatly disturbed by conflicts between Lord Baltimore's party and the traders, who under William Claiborne of Virginia claimed the territory. The proprietary party finally established its power. In 1688, Lord Baltimore's deputies declined to pro-

claim William and Mary, and the result was a revolt which led to the overthrow of the feudal system. The original charter limits of Maryland included all of Delaware and a considerable part of Pennsylvania, and conflicted with the grant to William Penn. The controversy between the two parties lasted from 1682 to 1760, when the Penn heirs proved successful and Maryland assumed its present limits. Mason and Dixon's line was established to mark the boundaries in 1763–67. In the Revolutionary War and the War of 1812, Maryland took an active and important part. In the war with Mexico, the state contributed 2,500 men. In the Civil War, the people of Maryland were divided in sentiment, but the state remained with the Union and contributed to both armies. Since the close of the war, Maryland has steadily prospered. The important cities and towns with population in 1900 are: Annapolis, the capital, 8,402; Baltimore, 508,957; Cumberland, 17,128; Hagerstown, 13,591; Frederick City, 9,296; and Cambridge, 5,747.

Mary Stuart (1542–1587), Queen of Scots, was b. at Linlithgow Palace, and was the daughter of James V by his queen, Mary of Lorraine, a princess of the family of Guise. Her father dying when she was a few days old, the regency was, after some dispute, vested in the Earl of Arran. In the summer of 1548 the young queen was sent by her mother to France, where she was educated in a French convent, and in 1558 was married to the dauphin, afterward Francis II. He d. seventeen months after his accession to the crown, in December, 1560, and in August, 1561, the widowed queen returned to Scotland. The calamities of Mary began with her second marriage, namely, to her cousin, Lord Darnley, 1565. Darnley was a Roman Catholic, and immediately after the marriage the Earl of Moray and others of the Protestant lords combined against the new order of things. They were compelled to take refuge in England, and the popularity of Mary began to decline. In addition to this Darnley proved a weak and worthless profligate, and almost entirely alienated the queen by his complicity in the murder of Rizzio, 1566, though a reconciliation seemed to be effected between them about the time of the birth of their son, afterward James VI of Scotland and I of England. About the close of the same year, however, Darnley withdrew from the court, and in the meantime the Earl of Bothwell had risen high in the queen's favor. When the young prince James was baptized at Stirling Castle, 1566, Bothwell did the honors of the occasion, and Darnley, the father of the prince, was not even present. Darnley had fallen ill, and was lying at Glasgow under the care of his father. Mary visited him, and took measures for his removal to Edinburgh. He was there tended by the queen herself; but during the absence of Mary at a masque at Holyrood the house in which Darnley lay was blown up by gunpowder, and he himself was afterward found dead. The circumstances attending this crime were very imperfectly investigated, but popular suspicion unequivocally pointed to Bothwell as the ringleader in the outrage, and the queen herself was suspected, suspicion becoming still stronger when she was carried off by Bothwell, with little show of resistance, to his castle of Dunbar, and married to him. A number of the nobles now banded together against Bothwell, who succeeded in collecting a force; but on Carberry Hill, where the armies met, his army melted away. The queen was forced to surrender herself to her insurgent nobles, Bothwell making his escape to Denmark. The confederates first conveyed the queen to Loch Leven Castle, where she was placed in the custody of Lady Douglas, mother of the Earl of Moray. A few days after, on June 20, a casket containing eight letters and some poetry, all said to be in the handwriting of the queen, fell into the hands of the confederates. They were held by the confederates to afford unmistakable evidence of the queen's guilt, and she was forced to sign a document renouncing the crown of Scotland in favor of her infant son, and appointing the Earl of Moray regent during her son's minority. After remaining nearly a year in captivity Mary succeeded in making her escape from Loch Leven (May 2, 1568), and, assisted by the few friends who still remained attached to her, made an effort for the recovery of her power. Defeated by the Regent's forces at the battle of Langside (May 13, 1568), she fled to England, and wrote to Elizabeth entreating protection and a personal interview; but this the latter refused to grant until Mary should have cleared herself from the charges laid against her by her subjects. For more than eighteen years she continued to be the prisoner of Elizabeth, and in that time the place of her imprisonment was frequently changed, her final prison being Fotheringay Castle, Northamptonshire. She was at last accused of being implicated in a plot by one Babington against Elizabeth's life, and having been tried by a court of Elizabeth's appointing, was on Oct. 25, 1586, condemned to be executed. There was a long delay before Elizabeth signed the warrant, but this was at last done Feb. 1, 1587. Mary received the news with great serenity, and was beheaded in the castle of Fotheringay. Authorities are more agreed as to the attractions, talents, and accomplishments of Mary Stuart than as to her character.

Masa'i Land, a region in eastern equatorial Africa, between the Victoria Nyanza and the sea, and so named from the Masai, who are its chief inhabitants.

Mas'carene Islands, the islands of Bourbon, Mauritius, and Rodriguez, so called from Mascarenhas, a Portuguese navigator, who discovered Bourbon in 1545.

Masinis'sa (240–148 B. C.), king of ancient Numidia, at first only of the eastern portion of the country, but latterly of the whole, having by the help of the Romans during the Second Punic War, defeated Syphax, king of Western Numidia, taking him prisoner with his wife Sophonisba.

Mask, a covering for the face, often shaped so as to form a rude representation of the human features. They have been in use from the most ancient times. Among the Greeks they were used particularly in the processions and ceremonies attending the worship of Dionysus (Bacchus). As the origin of Grecian tragedy was closely connected with the worship of Dionysus, masks were used in it even in the beginning. The ancient masks usually covered the whole head, and represented, with the features, the head, hair, and eyes. They had mostly very large open mouths, and seem to have had some effect in strengthening the voice of the speaker, this being required by the immense size of the old theaters. The Roman theater differed little from the Grecian in the use of the mask. The mask used at masked balls or masquerades is a covering for the head and face made from a light stuff, a common form being the half mask covering eyes and nose only.

Mason City, Cerro Gordo co., Ia., on Time River. Railroads: C. M. & St. P.; Iowa Central; M. C. & Ft. D.; B. C. R. & N.; and C. & G. W. Industries: brick and tile works, two flouring mills, iron foundry, planing mill, packing house, carriage, and farm implement factories. Pop. 1900, 6,746.

Mason and Dixon's Line, the line which separates the states of Maryland and Pennsylvania. From the time of the grant of the latter territory to William Penn by Charles II in 1681 there were disputes between the family of Penn and that of the Lords Baltimore, the possessors of Maryland, as to the boundary between the two territories. An agreement was at last come to in 1763, the line of demarcation being named after the astronomers Charles Mason and Jeremiah Dixon, who traced the greater part of it. Milestones were set up along the whole of this boundary line.

Masque (or Mask), a dramatic entertainment much in favor in the courts of princes during the sixteenth and seventeenth centuries, in the latter particularly in England. In its earliest form it is perhaps best described as a masquerade with an arranged programme of music, dancing, etc., and a banquet. The first masque of this kind in England, according to *Holinshed's Chronicle*, was performed in 1510, and they were frequently introduced into the plays of Shakespeare, Beaumont, and Fletcher. The parts in the masques of the sixteenth and seventeenth centuries were usually represented by the first personages of the kingdom; if at court the king, queen, and princes of the blood often performed in them. Under James I the masque assumed a higher character, more artistic and literary care being expended in its preparation. In this regard Ben Jonson takes an important place, his masques, despite much that is frigid and pedantic, having not a little genuine poetry. Inigo Jones was for a number of years exclusively employed upon the decorations and elaborate machinery of the court masques, and Henry Lawes wrote the music for several of them. Milton's *Comus* is, from the literary point of view, the most beautiful of the productions which bear the name of masque, though possibly defective in the matter of spectacle and music. The taste for masques decreased in the reign of Charles I, and after the interruption given to the progress of dramatic art and literature by the civil war they were not again brought into fashion.

Mass, in the Roman Catholic Church, the prayers and ceremonies which accompany the consecration of the eucharist. The word is used generally for all that part of the Catholic service in which the eucharist is offered. At present the mass consists of four chief parts: 1, the introduction; 2, the *offertorium*, or sacrifice; 3, the consecration; 4, the communion. These four chief parts, of which the latter three are considered the most essential, are composed of several smaller parts, each having its proper denomination. They consist of prayers, hymns, shorter and longer passages of the Holy Scriptures, and a number of ceremonies, which, as the essential point of the mass is the sacrifice of the Lord, consist partly of symbolical ceremonies commemorative of important circumstances in the Saviour's life, or signs of devotion and homage paid to the presence of the Lord in the host. The order of these ceremonies, and of the whole celebration of the mass, is given in the missal or mass book. The masses are modified according to many circumstances, e.g., according to the saint in honor of whom the mass is celebrated, or the seasons of the year connected with different events in the Saviour's life or the purpose for which the mass is said. *Votive mass* is an extraordinary mass, instead of that of the day, rehearsed on some special occasion. *Low mass* is the ordinary mass performed by the priest, without music. *High mass* is celebrated by the priest, assisted by a deacon and sub-deacon or other clergy, and sung by the choristers, accompanied by the organ and other musical instruments.

Massachusetts (mas'-a-chu'sets), the *Bay State*, a New England state, one of the original thirteen, is bounded on the n. by Vermont and New Hampshire; e. by the Atlantic ocean; s. by the ocean, Rhode Island and Connecticut; w. by New York. Its greatest length is 160 m.; average breadth, 50 m.; gross area, 8,315 sq. m. Pop. 1900, 2,805,346. Negroes, 31,974; Chinese, 2,968.

Surface.—The surface is uneven and in many parts rough and mountainous. In the west are the Hoosaac and Taconic ranges, comprising the region known as the Berkshire Hills. The principal elevation is the Saddleback (3,505 ft.). Mts. Tom and Holyoke are isolated peaks in the Connecticut valley, and Mt. Wachusett is in the n. central part of the state. The Connecticut is the largest river and crosses the state from n. to s. Its principal branches are the Westfield, Deerfield, Miller's and Chicopee. Other large rivers are the Hoosatonic, Merrimac, Nashua, Concord, Charles, Blackstone and Taunton. The state abounds in small streams. The coast is irregular and indented with numerous bays.

The principal ones are Buzzard's, Massachusetts and Cape Cod. The principal islands, Martha's Vineyard and Nantucket, lie off the southern coast.

Climate.—The climate is variable along the coast, with prevailing east winds. In the mountainous regions, the winters are very severe. In the interior, the temperature is more equable. The temperature ranges from 20° to 100°; the mean annual temperature is 48°; the average annual rainfall, 44.99 in.

Mining.—Minerals are not abundant, but there is some hematite iron ore and plenty of sandstone. The state is famous for its granite, together with Maine supplying more than any other two states. The chief quarries are at Cape Ann, Quincy and Monson. Other minerals are limestone, marble, soapstone, lead, copper, zinc, ochre and asbestos.

Agriculture.—The beautiful valleys of the Hoosatonic and Connecticut rivers are fertile, but the higher parts of the state and the long, sandy coasts are poor soil. Massachusetts is the least agricultural state in the Union and cannot even supply the home market. The state has taken active measures to increase interest in farming. The Massachusetts Agricultural College at Amherst has an experimental farm of 400 acres. The chief agricultural products are hay, straw, vegetables, dairy products, maple-sugar and apples.

Manufactures.—Massachusetts is pre-eminently a manufacturing state. There were in 1900, 29,180 manufacturing establishments with a capital stock of $823,264,287, and the total gross value of products was $1,035,198,989. It ranks fourth in industrial importance. The oldest watch factory in the U. S. and the largest in the world is at Waltham. More boots and shoes are made in Massachusetts than in any other state, the largest factories being at Lynn, Haverhill and Brockton. Lynn has also the largest works in the world for the manufacture of electrical apparatus. Lowell, Lawrence, Fall River and New Bedford have great cotton mills. Lowell has also the largest carpet mills in America; Taunton makes cotton goods, silverware and tacks; Westfield, whips; Roxbury, rubber goods; Gardner, chairs. Wire-drawing was begun in Massachusetts in 1666 and is still an important industry. Worcester has the most extensive iron and steel wire works in the world. At Dalton and Springfield are well-known paper mills, while at Holyoke more paper is manufactured than in any other city in the world.

Fisheries.—The fisheries of the state are very valuable. Almost the entire codfishing interests of the U. S. are centered in Massachusetts. Gloucester is the main cod and mackerel fishing point. New Bedford leads the world in whale fisheries. In lobster fishing the state is second to Maine only. There are fishing villages all along the coast where there are herring, blue-fish, halibut, haddock and the various shell fisheries.

Transportation.—The first railroad of the state was opened in 1835; since then Massachusetts has become a network of steel rails. There were in 1901, 2,107.51 miles of main and branch lines and 2,177 miles of street railways. Some of the principal railroads are: Boston & Maine, Old Colony, N. Y. N. H. & Hartford, Fitchburg, New England, Boston & Albany, Hoosac Tunnel and Wilmington. There were also 119 street railway companies, many of which operate inter-urban electric cars. One can travel almost all over the state and into Rhode Island, Connecticut and New Hampshire thus, and make good connections at the junction points, such as Lowell, Boston, Taunton, Fitchburg, Worcester, Milford and Haverhill. The shipping trade of Boston is next in volume to that of New York. Steamships and sailing vessels connect Boston with the principal ports of the Atlantic states and with foreign countries.

Education.—The first free school of Massachusetts was organized in 1635. The school system is now one of the finest in the world, and Boston is celebrated as a center of education and culture. Horace Mann (which see), the first secretary of the Massachusetts State Board of Education, by his excellent services, gave inspiration to schools all over the country. In 1636, Harvard University was founded at Cambridge. It has now over 14,000 alumni (1902). Other educational institutions are: Williams College, Williamstown; Amherst, at Amherst; College of the Holy Cross, Worcester; Tufts College, Tufts Coll. Station; Clark Univ., Worcester; Mt. Holyoke, South Hadley; Wellesley, at Wellesley; Smith, at Northampton; Radcliffe, at Cambridge; Andover Theol. Seminary, Andover (Cong.); Newton Theol. Institution, Newton (Bap.); New Church Theol. School and Prot. E. Theol. School, Cambridge; Mass. Agricultural College, Amherst; and Boston Institute of Technology, Boston University, and New England Conservatory of Music, Boston. Massachusetts has numerous charitable schools and asylums, and many reformatories and industrial institutions. Among the many public libraries in the state the finest is that of Boston.

History.—Norsemen first explored the coast of Massachusetts, probably about 1000 A. D.; in 1497, the Cabots reached its coast; in 1602, Bartholomew Gosnold, with a company of English colonists, made a settlement on the Elizabeth Islands, but it was soon abandoned; in 1614, John Smith explored the coast, but it was not until 1620 that a permanent settlement was made. In that year, about 100 English, who had sought religious liberty in Holland, landed in the Mayflower at Plymouth. They are now known as the Pilgrim Fathers, and the stone upon which they landed, Plymouth Rock, is a cherished landmark. Before landing the colonists drew up a solemn compact by the terms of which they were to be ruled. In 1628, settlements were made at Salem by a company of Puritans under Endicott. This, together with settlements at Boston and elsewhere, formed the Massachusetts Bay Colony. The colonists endured many privations and suffered greatly in the Indian wars. The history of the Plymouth colony is not marred by rec-

ords of religious narrowness, but intolerance was the dominating spirit of the Massachusetts Bay colony. In 1692, the two colonies were united under a new charter, under which the governor, lieutenant-governor and secretary were appointed by the king of England. In 1692, the witchcraft delusion broke out and a number of persons were hanged. In 1675–76, occurred a war with the Indians, King Philip's War. In all her wars with France from 1690 to 1748, England received loyal assistance from Massachusetts. The Boston Massacre (1770), the destruction of the tea (1773), the Port Bill (1774) are notable incidents preceding the War of the Revolution, which began in Massachusetts in 1776 with the battles of Lexington and Bunker Hill. Throughout this war, the state sustained its reputation for patriotism and public spirit. In 1780, a constitution was framed. In 1820, the district of Maine was separated from Massachusetts. The state took an active part in the Civil War, furnishing 159,165 men. Much of the prosperity of the Union is due to this state, which is noted for its advocacy of reforms of all kinds. The leading cities with population in 1900 are: Boston, the capital, 560,892; Worcester, 118,421; Fall River, 104,863; Lowell, 94,969; Cambridge, 91,886.

Massachusetts Bay, a large bay to the east of the central part of Massachusetts; bounded on the n. by Cape Ann, and on the s. by Cape Cod.

Massage (mas'ăzh), a form of medical treatment in which the body of the patient, or some particular part of it, is subjected at the hands of an attendant to a variety of processes technically discriminated as stroking, rubbing, kneading, pinching, pressing, squeezing, and hacking. The tendency of this treatment is to assist and stimulate the circulation, and to increase the waste-removing action of the lymphatic vessels, and thus to affect the nutrition, not only of the parts acted upon, but of the whole body, and promote the removal of local swellings, inflammatory products, etc. The process, for which half an hour daily is usually sufficient, is performed upon the naked skin by the bare hands of the operator, no oil being used; and the hands ought to be strong and firm, but soft, very considerable exertion being expended in the operation. The attendant needs to be carefully trained, and should have a sufficient knowledge of anatomy to be able to separate out with the fingers a single muscle or group of muscles for treatment, and to trace the direction of the larger vessels and nerve-trunks and act upon them directly. The principal movements should be characterized by a certain uniformity and method. Thus in stroking with a steady pressure the limbs of the patient, the strokes should always be from the extremities toward the heart, not backward and forward in a random way; and in kneading the belly with the heel of the hand, the movements are carried around in the direction of the colon. The treatment has been remarkably successful in cases of nervous disorder of a hysterical kind, and in cases of wasting through imperfect nutrition dependent upon disturbances of stomach, bowels, or liver; and it has proved valuable in diabetes, some of the special diseases of women, and certain cases of paralyzed and contracted muscles.

Masséna (mȧs-ā-nȧ), ANDRE (1758–1817), Marshal of France. During the revolution he entered a battalion of volunteers, was elected chief of his battalion in 1792, and in 1793 made general of brigade. In 1793 he was appointed general of division, and took command of the right wing of the French army in Italy. In 1804 he was created marshal of the empire. In 1805 he received the chief command in Italy. In 1807 he was given the command of the right wing of the French army in Poland, and soon after received the title of Duke of Rivoli. Napoleon rewarded him with the dignity of Prince of Esslingen. In 1814 he was made a peer by Louis XVIII.

Massenet (mȧs-nā), JULES, French composer, b. in 1842. He studied at the Paris Conservatoire, of which in 1878 he became a professor. He is the composer of several operas, of which the best known are *Herodias*, *Don César de Bazan*, and *Manon Lescaut*.

Massey, GERALD, English poet, b. at Tring in 1828, of poor parents, and for some time an errand boy in London. He subsequently edited the *Spirit of Freedom*, a Radical paper, and in 1854 published his *Ballad of Babe Christabel*, and other poems. One of the best of his prose works is the ingenious *Secret Drama of Shakespeare's Sonnets*.

Massillon, city in Stark co., O., 65 m. s. of Cleveland; on the Tuscarawas river, the Ohio Canal and the Pennsylvania, the Wheeling & Lake Erie and the Clev., Lorain & Wheeling railroads. It lies in the center of a great coal region and in the vicinity are quarries of valuable white sandstone. Among the manufactures are farm implements, engines, bar iron, iron bridges, glass bottles, stoves, furnaces and steel tubing. It is the seat of a state hospital and asylum for the insane. Pop. 1900, 11,944.

Masson, DAVID, critical and biographical writer, b. in Aberdeen in 1822, educated at the Marischal College and at Edinburgh University. In 1859 he became editor of *Macmillan's Magazine*, and in 1865 accepted the chair of rhetoric and English literature in the University of Edinburgh. His works include his collected contributions to the quarterlies and other magazines; an elaborate and comprehensive study of Milton's life and times; *British Novelists and Their Styles; Recent British Philosophy* and *Edinburgh Sketches and Memories*.

Master, in the navy, the name of the officer who has charge of the details of the navigation of the ship under the general orders of the captain. In the mercantile navy, the master is the person entrusted with the chief command of the vessel, and usually styled by courtesy the captain. He is the confidential servant or agent of the owners, who are bound to answer for a breach of contract committed by him. The master has power to hypothecate or pledge the ship and cargo for necessary

repairs executed abroad. He may enforce obedience to his lawful commands by reasonable and moderate chastisement, but has no jurisdiction over a criminal; his business is to deliver him to the proper tribunals. He is compelled to keep a proper log book, and must produce it, with the ship's papers, on the requisition of the commander of a ship of war of his own nation. The master of an American ship must be a citizen of the U. S.

Master and Servant.—In legal acceptation a servant is one who owes his services to another for a limited period. Servants consist of two classes, namely, those who engage to perform certain duties for certain wages, and apprentices who may receive something by way of wages, but who have to be taught a trade. The chief classes of servants are: agricultural laborers, operatives or skilled laborers, and menials or domestic servants.

Masters in Chancery, officers appointed by the courts of chancery to take accounts and make computations, to take testimony, to make investigations into the state of facts in given cases and report, to act under the direction of the court in the sale of property, etc. The office of master in chancery is a very old one, having been an accessory of chancery practise in the English courts from the earliest times. The original idea of the appointment of master was to aid the court in the ascertainment of simple facts or to assist in the computation of amounts where money judgments were rendered. In process of time, however, the scope of the office was enlarged, and the judges or chancellors became accustomed to lean to a large extent, in the decision of cases, upon the assistance of the masters. This has been especially the case with the courts of this country. Masters in chancery have been appointed, as a rule, only in those states in which the common law of England (in contradistinction from the civil law, which prevailed in the states acquired under the Louisiana purchase). In the other states, such as Louisiana, special commissioners take the place of masters. The statute of Illinois, for example, providing for masters in chancery, was passed prior to 1845, and as amended, defines the duties of masters as follows: "To take depositions, both in law and equity, to administer oaths, to compel the attendance of witnesses, take acknowledgments of deeds and other instruments in writing, and, in the absence from the county of the judge, to order the issuing of the writs of *habeas corpus, ne exeat,* and injunction, and perform all other duties which, according to the laws of this state and the practise of the courts of chancery, appertain to the office." From this it will be seen that the scope of the office of master has been materially enlarged in later years. The range of duties of the position, though varying in the several states,—in some of them defined by statute and in others only by the regulations prescribed by the courts,—do not generally differ materially from those laid down by the Illinois statute. Special commissioners in chancery are also often appointed, whose duties differ little from those of masters. The great benefit to the courts of masters in chancery, as the office is now constituted, is apparent when the press of legal business everywhere prevailing is taken into consideration. Where formerly the judges spent weary weeks in wading through quires of testimony, they can now turn the evidence over to the master and base their decisions upon his report. But while the report of a master is generally taken by the judge, there is no obligation on his part to do so, and the acceptance or rejection of the finding of the master is entirely within the discretion of the court, so that the office is in no wise judicial in its character, but strictly ministerial. It should be added, however, that, as the appointment of master in chancery is considered of more importance than it formerly was, a higher sanction attaches to reports of masters, and judges are inclined to make their acceptance and confirmation a rule. It will thus be seen that the selection of master in chancery should be made with extreme care, and the office should be the last one that should be conferred for political favors. Divorce cases are no longer, as a rule, referred to masters, but sometimes to special commissioners.

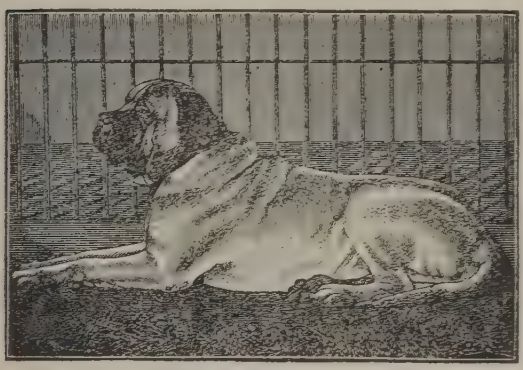
Master of Arts, an academical honor conferred by the universities of the U. S., Germany, Great Britain, etc., upon the students after a course of study and a previous examination in the chief branches of a liberal education, particularly languages, philosophy, mathematics, physics, and history. The precise period of the introduction of this title is not known; but even in the twelfth and thirteenth centuries the honor was so highly esteemed in France that the most distinguished men were eager to obtain it. Afterward, when the universities were multiplied, and many abuses crept in, it lost much of its importance.

Master Singers (German, *Meistersinger*), the name of a literary guild or association which flourished in Mainz, Strasburg, Augsburg, Nürnberg, and various other German cities, in the fourteenth and fifteenth centuries, in some cases surviving even to recent times. It represents the poetical efflorescence of burgher life as the Minne-singers had represented that of the feudal chivalry. The members of the guild met and criticised each other's productions in accordance with a remarkable series of canons dealing with literary form. Victory in their own competitions carried with it the right to take apprentices in song craft, who at the expiry of their term, and after singing for some time with acceptation, were themselves admitted as full masters. Among the most famous master singers were Hans Sachs, Henry of Meissen (Frauenlob), Regenbogen, Hadlaub, and Muscatblut. The development of artificial canons in the search for novelty ultimately reduced the whole scheme to utter absurdity.

Mastication, the process of division of the food effected in the mouth by the combined action of the jaws and teeth, the tongue, palate, and muscles of the cheeks. This process

is seen in its typical perfection in the higher Vetebrata only. By it the food, besides being triturated, is mixed with the salivary fluid. Imperfect mastication is a fertile source of indigestion.

Mastiff, a race of large dogs found under various names. The mastiff is a noble looking dog with a large head, a broad muzzle, lips thick and pendulous on each side of the mouth, hanging ears and smooth hair, the height at



English Mastiff.

the shoulders usually ranging from 25 to 29 in. The usual color is some shade of buff with dark muzzle and ears.

Mas'todon, an extinct genus of Proboscidea or Elephants, the fossil remains of which first occur in the Miocene rocks of the Tertiary period, and which persist through the Pliocene and Post-Pliocene epochs also. In general structure the mastodons bear a close resemblance to the existing species of elephants. Their chief peculiarities consist in the dentition and structure of the teeth, from the curious mammillary processes on which the generic name is derived. The geographical range of the mastodons included North America, Europe, and Asia; an American specimen measured 18 ft. in length and 11 ft. 5 in. in height.

Matabe'le, a Kaffir race or tribe inhabiting part of South Africa between the Limpopo and Zambesi, north of the Transvaal, into which they removed from Natal in 1827 under the leadership of their chief Moselikatse. They are a warlike people, estimated to number about 40,000. The country is traversed by ranges of hills and numerous streams, has good pasture, and is believed to be rich in gold.

Matamo'ras, a town of Mexico, department of Tamaulipas, on the right bank of the Rio Grande del Norte, about 10 mi. above its mouth in the Gulf of Mexico. Pop. about 12,000.

Matan'zas, a seaport on the northwest coast of Cuba, 52 mi. e. of Havana, with one of the largest, safest, and most convenient harbors in America. It has considerable commerce, exporting sugar, molasses, and coffee, and ranking in importance next to Havana. Pop. 36,374.

Matches, in the most common sense of the term, are splints or small slips of wood, one end of which is dipped into a composition that ignites by friction or other means. One of the first forms of this article was the brimstone match, which was a thin strip of resinous or dry pine wood with pointed ends dipped in sulphur, which were lighted with tinder ignited by a flint and steel. The lucifer match was introduced in 1827, the inflammable substance being a mixture of chlorate of potash and sulphide of antimony, applied to the match, which had been previously dipped into melted sulphur. The matches were ignited by being drawn smartly through a piece of folded sandpaper. This was succeeded after a few years by the Congreve match, in which phosphorus was substituted for the sulphide of antimony. Many improvements have since been made both in the composition of the igniting materials and in the processes of manufacture. Sulphur, owing to its offensive smell, is now commonly discarded in favor of paraffin. The igniting composition is essentially an emulsion of phosphorus in a solution of gum or glue, combined with a quantity of chlorate of potash, red lead, or nitrate of lead, to increase the combustibility, and some coloring matter as cinnabar, smalt, etc. The use of common phosphorus has led to many accidental deaths and even to wilful poisoning. The operatives, also, who are exposed to the phosphoric fumes during the process of manufacture, are subject to an insidious disease which frequently proves fatal. Fortunately all risks whatever may be avoided by the use of amorphous phosphorus, which is an efficient substitute, and entirely innocuous. *Safety matches* were invented in Sweden in 1855, and are now extensively used. In the safety match the composition is divided between the match and the friction paper attached to the box, so that the match can only be lighted in ordinary circumstances by being rubbed on the prepared paper. The compound put on the match consists of chlorate and bichromate of potash, red lead, and sulphide of antimony, while the friction paper is coated with a mixture of amorphous phosphorus and sulphide of antimony. *Vestas* are a kind of matches made of a wick of fine cotton threads coated with stearin and paraffin, smoothed and rounded by being drawn through a metal plate pierced with circular holes of the desired size; the wick is then cut into vesta lengths, which are tipped with the ordinary igniting composition. *Fusees* are made of a thick spongy paper soaked in a solution of niter and bichromate of potash, and tipped with the usual ingredients. *Vesuvians* are round matches of wood having a large head at each end made of a mixture of charcoal, niter, etc., and tipped with the ordinary igniting composition.

Mate, an officer in a merchant-ship or ship-of-war, whose duty is to assist the master or commander, and to take, in his absence, the command. There are sometimes only one, and sometimes two, three, or four mates in a merchantman, according to her size, denominated *first, second, third,* etc., mates. The law of the U. S. recognizes only two descriptions of persons in a merchantman—the master and mariners, the mates being included in the lat-

ter, and the captain being responsible for their proceedings.

Maté (mä′tā), the plant that yields Paraguay tea. It has smooth, ovate-lanceolate, unequally serrated leaves, much branched racemes of flowers, the subdivisions of which are somewhat unbellate. In Brazil and other

Maté.

parts of South America the leaves are extensively used as a substitute for tea, the name *Maté* having been transferred to the plant from the gourd or calabash in which the leaves are infused.

Materialism, in philosophy, that system which denies the existence of a spiritual or immaterial principle in man called the mind or soul, distinct from matter; or in a more extended sense, the doctrine that is founded on the hypothesis that all existence (including, of course, the conscious subject) may be resolved into a modification of matter.

Mate′ria Med′ica, the collective name given to the materials with which physicians attempt to cure or alleviate the numerous diseases of the human body, and which comprehend a great variety of substances taken from the mineral, animal, and vegetable kingdoms — such as mercury, antimony, arsenic, and zinc, from among the metallic bodies; sulphur, lime, soda, niter, magnesia, borax, and several salts, from among the other minerals; and some 200 substances belonging to the animal and vegetable kingdoms.

Mathematics is the science in which known relations between magnitudes are subjected to certain processes which enable other relations to be deduced. Mathematical principles which are deduced from axioms with the help of certain definitions belong to *pure* mathematics, and those which have been deduced with the help of pure mathematics from certain simple physical laws, belong to *mixed* mathematics. Arithmetic, geometry, algebra, plane and spherical trigonometry, analytical or co-ordinate geometry, the differential and integral calculus, quaternions, the calculus of finite differences, etc., are departments of pure mathematics; the dynamics of rigid bodies and the application of its principles in astronomy and in investigating the actions of forces on ordinary matter, acoustics, the undulatory theory of light, optics, thermo-dynamics, electricity, magnetism, etc., are departments of mixed mathematics.

Mather, Cotton, D. D. (1663–1729), writer, the eldest son of Increase, b. in Boston. He graduated at Harvard College in 1678, and in 1684 was ordained minister in Boston as colleague of his father. In 1685 he published his *Memorable Providences Relating to Witchcraft and Possessions*, which was used as an authority in the persecution and condemnation of nineteen victims burned for witchcraft at Salem in 1692. He d. with the reputation of having been the greatest scholar and author that America had then produced, his publications, some of huge dimensions, amounting to 382.

Mather, Increase, D. D. (1639–1723), one of the early presidents of Harvard College, was b. at Dorchester, Mass.; graduated at Harvard in 1656; ordained a minister in 1661; president of Harvard College from 1685 to 1701. In 1689 he was deputed to England, as agent of the province to procure redress of grievances. He held conferences with King James II, and with William and Mary, and in 1692 returned to Boston with a new charter from the Crown, settling the government of the province.

Mathews, Charles (1776–1835), an eminent English comedian, b. in London, son of a bookseller. After playing with success at the Drury Lane, Lyceum, Haymarket, Covent Garden, and various provincial theaters, he instituted, in 1818, a species of entertainment in the form of a monologue. He was twice enthusiastically received in America.

Mattapan, Suffolk co., Mass., on Neponset River, 7 mi. s. of Boston. Railroads: New England; and N. Y., N. H. & H. It is a village within the limits of Boston, and is a part of the Dorchester district which was annexed to Boston in 1867. Along the Neponset River at this point was the home of the Mattapanock Indians.

Matteawan, Dutchess co., N. Y., near Hudson River, 60 mi. n. of New York City. Railroads: N. Y. C.; Newburgh, Dutchess & Conn.; and New England R. R. Industries: straw hat works, flour mills, iron foundries, wool hat factory, india rubber works, electric light and power works. Surrounding country agricultural and mineral. Population, 1900, 5,807.

Matter, that which occupies space, and through which force is manifested. It is also that which makes itself known to us by our bodily senses, though there is believed to exist one kind of matter at least which is too subtle to be perceived by the senses, namely, the intermolecular and interstellar ether. Roughly speaking, matter exists in one of three states,—solid, liquid, or gaseous—but these are not marked off by any distinct line. Matter is commonly regarded as the antithesis of mind.

Matthew, St., evangelist and apostle, son of Alpheus, previous to his call a publican or officer of the Roman customs, and, according

to tradition, a native of Nazareth. After the ascension of Christ we find him at Jerusalem with the other apostles, but this is the last notice of him in Scripture. Tradition represents him as preaching fifteen years in Jerusalem, then visiting the Ethiopians, Macedonians, Persians, Syrians, etc., and finally suffering martyrdom in Persia.

Matthi'as Corvi'nus, king of Hungary, second son of John Hunniades. The enemies of his father kept him imprisoned in Bohemia, but in 1458, at the age of sixteen years, he was called to the throne of Hungary. He maintained his position against Frederick III, repelled the invading Turks, and between 1468 and 1478, conquered Silesia, Moravia, and Lusatia; he was also victorious over the Poles, and took the greater part of Austria, including Vienna, from Frederick, and held all his extensive conquests till his death.

Mattoon, Coles co., Ill. Railroads: Illinois Central; C. C. C. & St. L.; and P. D. & E. Industries: brick, tile, and broom factories, carriage and machine shops, wagon works, and railroad machine shops, also large grain elevators. Pop. 1900, 9,622.

Mauna Loa, a celebrated volcano in the Sandwich Islands near the center of Hawaii, height 13,600 ft.

Maundy Thursday, the Thursday in the Passion week. It used to be the custom in England and other countries, and still is in Austria, for the sovereign to wash the feet of a certain number of poor persons, and make them presents on this day; and in Rome the pope washes the feet of some of the bishops. the ceremony commemorates Christ's washing of the apostles' feet.

Maurice of Nassau (1567–1625), Prince of Orange, stadtholder of the Netherlands, the youngest son of William the Silent. He was elected stadtholder of the provinces of Zeeland and Holland on the assassination of his father in 1585, and subsequently of Utrecht, Overyssel, and Gelderland; and as commander of the army of the Netherlands; he carried on war against the Spaniards with extraordinary success.

Mauricius, Flavius Tiberius (539–603), one of the greatest Byzantine emperors. He distinguished himself in war against the Persians, obtaining by his complete victory over them in 581, the honor of a triumph at Constantinople. On the death of Emperor Tiberius, whose daughter he had married, he ascended the throne (582).

Mauritania (or Mauretania), the ancient name of the northwestern portion of Africa, corresponding in its area to the present Morocco and the western part of Algeria. The ancient boundary of Mauritania on the south was the Atlas. In A. D. 40 it became a Roman province. From 429 to 534 A.D. it was held by the Vandals, and in 650 A.D. it was conquered by the Arabs.

Mauritia (or Buriti) **Palm,** called also the Brazilian wine palm, one of the tallest of the palms, rising to a height of 100–150 ft. with a diameter of only 2 ft., and bearing an imposing crown of immense fan-shaped leaves with long foot-stalks. The fruit is of the size of a hen's egg. To the same genus belongs the fan palm of the Orinoco, which furnishes the Guarani Indians with all the necessaries of life.

Mauritius (or Isle of France), an island in the Indian Ocean, 400 mi. e. from the island of Madagascar. It is of an oval form, about 40 mi. long from n. e. to s. w., and 25 mi. in breadth, and is surrounded by coral reefs. It is composed chiefly of rugged and irregular mountains. Between the mountains and along the coast there are large and fertile plains and valleys, having a rich soil of black vegetable mold or stiff clay. The climate is pleasant during the cool season, but oppressively hot in summer. The principal objects of cultivation are sugar, rice, maize, cotton, coffee, manioc, and vegetables. The government is vested in a lieutenant governor and legislative council. Mauritius was discovered in 1505 by the Portuguese. After occupation by the French it was captured by Britain in 1810. Principal towns Port Louis and Mahébourg. Pop. 368,163.

Maury, Matthew Fontaine (1806–1873), naval officer and hydrographer, was b. in Virginia, and entered the U. S. navy in 1825. In 1839 he was lamed by an accident, and quitted active service afloat for scientific work at the Washington Observatory. He wrote valuable papers on the Gulf Stream, ocean currents, great circle sailing, etc., and his *Physical Geography of the Sea*, published in 1856, gave him a wide reputation. In 1861 he entered the Confederate service, in which he obtained the rank of commodore. After the termination of the war he went to Mexico, Russia, and England, and in 1368 became professor of physics in the Virginia Military Institute.

Mausole'um (Greek, *mausoleion*), a sepulchral monument, so named from Mausōlus, a king of Caria, to whom his wife Artemisia erected a monument which became so famous as to be esteemed the seventh wonder of the world, and to give a generic name to all superb sepulchers. From Pliny we learn that its height was 140 ft. In modern times the term is applied generally to a sepulchral edifice erected for the reception of a monument, or to contain tombs.

Mauvaises Terres, "bad lands," the name given to desolate tracts of land in various parts of the western states of North America; more especially to a barren region in Dakota along the White River, an affluent of the Missouri.

Maxen'tius, M. Aurelius Valerius (306–312), a Roman emperor. He reigned along with his father for a short time; was defeated by Constantine and in the retreat drowned in the Tiber.

Maximia'nus, Marcus Aurelius Valerius Herculius, a Roman emperor, who became colleague of Diocletian in the empire 286 A. D. He endeavored to murder his rival Constantine, to whom he had given his daughter Faustina in marriage, and being frustrated by the fidelity of the latter, strangled himself 310.

Maximil'ian I (1459–1519), emperor of Germany. In 1486 he was elected king of the Romans, and emperor in 1493. He first became an independent prince by his marriage with Mary of Burgundy. This match involved him in a war with Louis XI, king of France, in which he was successful.

Maximilian II (1527–1576), emperor of Germany. He succeeded his father, Ferdinand I, in 1564.

Maximilian (1832–1867), emperor of Mexico, b. at Vienna. In 1863 he was induced by the Emperor Napoleon, and also by a deputation of Mexican notables, to accept the throne of Mexico. With this intention he entered Mexico in 1864. Having become involved in financial and political difficulties, Maximilian, with the approval of Napoleon, resolved to abdicate, and had proceeded to Orizaba when he was induced to return by the Conservative party in the state. The fighting which followed culminated in the capture and execution of the emperor and two of his chief generals.

Maximi'nus, Caius Julius Verus, Roman emperor, the son of a peasant of Thrace. He entered the Roman army under Septimus Severus before 210, and gradually rose in rank until, on the death of Alexander Severus, he caused himself to be proclaimed emperor, A. D. 235.

May Apple, a plant, a native of North America, and its creeping root-stalk affords an active cathartic medicine. The yellowish, pulpy fruit, of the size of a pigeon's egg, is slightly acid, and is sometimes eaten.

Mayas, a race of Indians inhabiting Yucatan and the adjacent regions of Mexico and Central America, believed to be the descendants of those who built the great ruined cities of these parts.

Mayor, the chief magistrate of a city or corporate town in the U. S., England, Ireland, and the British colonies. In the U. S. the mayor is elected by the qualified voters of the city or town for a certain term of years. The power and authority which mayors possess, being given to them by local regulations, vary in different places.

Mayotte' (or Mayot'ta), an island in the Indian Ocean, one of the Comoros, at the n.e. entrance of the Mozambique Channel. It is about 30 mi. long by 20 mi. broad.

Maysville, Mason co., Ky., on the Ohio River. Railroads: Kentucky Central, and Chesapeake & Ohio. Industries: cotton and flour mills, distilleries, plow works. From this point large quantities of hemp, pork, and tobacco are shipped. Pop. 1900, 6,423.

Mazarin (mȧ-zȧ-ran), Jules (or Giulio Mazarini) (1602–1661), first minister of Louis XIV and cardinal, an Italian by origin. He entered the pope's military service, and distinguished himself by diplomatic ability, for which he was rewarded with two canonries, and the appointment of nuncio to the court of France (1634–36). Here he gained the favor of Richelieu; accepted service from the king, and became a naturalized citizen of France; was made a cardinal in recognition of his diplomatic services in Savoy; and in 1642, when Richelieu died, Mazarin promptly succeeded him. On the death of Louis XIII he gained over the queen-regent, and made himself master of the nation. The parliament of Paris denounced his increasing taxation, while the nobility dreaded his supremacy, and the combination of these malcontents resulted in the civil war of the Fronde. As the immediate result of the conflict, Mazarin had to go into exile, but finally returned to his position at court in 1653. During the succeeding eight years he remained all-powerful in France.

Mazatlan', a seaport in Mexico, in the state of Sinaloa, at the entrance into the Gulf of California. It forms the outlet for the gold and silver of the neighboring mines, and imports considerable quantities of English goods. Pop. 16,000.

Mazzini (mȧt-sē'nē) Giuseppe (1805–1872), Italian patriot, b. at Genoa. His first significant essay was *Dante's Love of Country.* As his writings grew more distinctly liberal in their politics the government suppressed the *Indicatore Genovese* and the *Indicatore Livornese,* the papers in which they appeared. He afterward joined the Carbonari, and was imprisoned in Savona for some months. On his release (1832) he was exiled to Marseilles, but was compelled by the French government to retire into Switzerland. During the following five years he planned and organized various unsuccessful revolutionary movements, until, in 1837, he was expelled by the Swiss authorities and sought refuge in London. During the revolutionary movements of 1848 he proceeded to Italy, served for a time under Garibaldi, and when the pope fled from Rome he became president of its short-lived republic, made a heroic defense of the capital against the French, until compelled to surrender. From that time he continued to organize various risings in Italy, and the successful Sicilian expedition of Garibaldi in 1860 was due largely to his labors.

Meade, George Gordon (1815–1872), soldier, was b. in Cadiz, Spain. He served in the Mexican and Seminole wars. In the Civil War he was especially distinguished. In 1863, as commander of the Army of the Potomac, at Gettysburg, he checked Lee's invasion of Pennsylvania. He was in every battle but two fought by the Army of the Potomac.

Meadville, county seat of Crawford co., Pa., 126 m. n. of Pittsburg; on the Venango river, and on the N. Y., Pa. & O. and the Pitts., Shen. & Lake Erie railroads. It is in an agricultural region. The industries include the manufacture of engines and boilers, oil-well supplies, leather belting, wood mantels and distillery and brewery products. Meadville is the seat of Allegheny College (M. E.) and of a Unitarian Theological School. Pop. 1900, 10,291.

Mecca (or Mekka), a city of Arabia, about 60 mi. from Jidda, its port on the Red Sea, and the birthplace of Mohammed, consequently the holiest city of the Mohammedan world. It stands in a narrow sandy valley. In its center

is the Beitu-'llah (house of God) or El-Haram (the inviolable), the great mosque enclosing the Kaaba, occupying a square dividing the upper from the lower town. The city is annually filled at the time of the Hajj or pilgrimage to the Kaaba. This pilgrimage, enjoined by Mohammed on all his followers, is the sole foundation of Mecca's fame, and the only source of its wealth and occupation. The pop. is estimated at 50,000, with the periodical addition of from 100,000 to 150,000 pilgrims.

Mechanical Powers, the simple instruments or elements of which every machine, however complicated, must be constructed; they are the lever, the wheel and axle, the pulley, the inclined plane, the wedge, and the screw.

Mechanics, the term originally used to denote the general principles involved in the construction of machinery. Latterly the term became divorced from all direct connection with practical applications, and dealt entirely with abstract questions in which the laws of force and motion were involved. In this sense mechanics is usually divided into *dynamics*, which treats of moving bodies and the forces which produce their motion; and *statics*, which treats of forces compelling bodies to remain at rest.

Mechlin (mek'lin), a town of Belgium, on the Dyle, in the province and 14 mi. s.s.e. of Antwerp. Its principal edifices are its cathedral, an ancient Gothic structure, the church of Notre Dâme, the church of St. Peter and St. Paul, and the archbishop's palace. The manufactures consist of the famous Mechlin lace, felt and straw hats, woolen stuffs, etc. Pop. 47,670.

Mede'a, in Greek mythology, daughter of Æetes, king of Colchis, on the eastern coast of the Black Sea. She enabled Jason to obtain the celebrated golden fleece, and lived with him for ten years, until he discarded her in favor of Glauce or Creusa, daughter of King Creon. In revenge she sent Glauce a bridal robe which enveloped her in a consuming flame, and thereafter she slew her own children by Jason.

Medellin (me-del-yēn'), a city of Colombia, capital of the department and 40 mi. s.e. of Antioquia. Pop. 20,000.

Medford, Middlesex co., Mass., on Mystic River, 5 mi. w. of Boston. Railroads: Western and Southern divisions of Boston & Maine. Industries: wire works, print and dye works, carriage, mattress, bicycle, sole cutting machine, and several brick factories. The town was first settled in 1630, became a town in the same year and a city in 1892. The Craddock house erected in 1634, the oldest in N. A. retaining its original shape. Population, 1900, 18,244.

Media, an ancient country in Western Asia, formerly the seat of a powerful kingdom, corresponding nearly to the northwestern portion of modern Persia.

Medical Jurisprudence, also called Forensic Medicine, is the branch of medicine which brings medical science to bear on legal questions in determining criminal and civil responsibility. It has regard mainly either to civil rights or to injuries to the person. Among subjects in its province are those connected with birth, pregnancy, murder, natural death, rape, insanity, monstrosity, accidental or intentional injuries, the action of drugs, etc., all of which are dealt with in their several places.

Medici (mā'di-chē), a Florentine family who rose to wealth and influence by successful commerce, and who continued to combine the career of merchants and bankers with the exercise of political power, a princely display of private munificence, and a liberal patronage of literature and art. The Medici were associated with the history of the Florentine republic from an early period, but they first became prominent in 1378.

Medicine, the science of diseases, and the art of preventing, healing, or alleviating them. It deals with the facts of disease, with the remedies appropriate to various diseases, with the results of accident or injury to the human body, with the causes that affect the origin and spread of diseases, and with the general laws that regulate the health of individuals and the health of communities. It is broadly divided into two great sections, surgery and medicine proper; that is to say, the diseases affecting the outer frame visible to the eye are relegated to the care of the surgeon, while those that affect the internal organs belong to the province of the physician. A department related to both is obstetric medicine or midwifery, dealing with child-bearing and with the diseases peculiar to women. With this department is closely connected that which comprehends the diseases of children. There are also departments dealing with special organs, such as those relating to diseases of the eye, of the ear, of the throat, of the skin, etc., each of which occupies its own domain of knowledge, and is represented by highly trained specialists. The treatment of the insane, as it is concerned with nervous diseases and correlated states of other organs, is an integral part of medical practise. War also has given rise to special developments of medical and surgical science, viz., military hygiene and military surgery; and the administration of the law has created a special branch — medical jurisprudence or forensic medicine.

At first all diseases, in common with other phenomena, were attributed to supernatural causes, and the direct doings of unseen beings; and had to be exorcised by ceremonies, prayers, and adjurations. In course of time it was recognized that diseases were natural phenomena, but at the same time each was held to be a principle or entity distinct from its effects, and each disease was supposed to have a specific remedy—something that would actually cure the disease. Such views led to the adoption of various systems of treatment. For instance, one school held that only vegetable remedies were appropriate to the treatment of diseases; another school upheld the hydropathic system, or the virtues of the bath in one or other of its forms as a universal pan-

acea for all human ills. A third maintained the application of the homœopathic principle that similars are cured by similars, that is to say, diseases are cured by substances having, in small doses, an action on the body similar to that of the disease, so that one might treat diseases by a series of fixed and specific formulæ all depending on this single principle. Finally, even in orthodox medical circles there is a strong disposition to attribute success of treatment to particular drugs, and to simply act on a principle contrary to that of homœopathic, viz., that diseases are cured by contraries, that is, by remedies having an action on the body the reverse of that of the disease. All these opinions depend on a mistaken view of disease. Anything that interferes with the free and healthy action of any part of the body produces a state of disease, and the symptoms of the disturbance manifest the disease. For instance, in the case of zymotic diseases, they are caused by the entrance into the body of living germs which grow and multiply in the blood and tissues, and interfere with the various organs. These germs are, however, not the disease, but the cause of the disease. Again, many diseases are due not to something that has entered the body, but to a breaking down of a certain part of the system. It is clear, therefore, that no specific remedies can be applied to such diseases. The object of the physician is to restore as far as possible the conditions of healthy action: to remove if he can the causes of the disease, to relieve pain, and to control symptoms so as to direct them toward recovery.

The chief departments of medical science may be given as follows: The science of health is called *hygiene*, or as far as it relates to the regulation of the diet, *dietetics*. *Pathology* is the science of disease, of that in which it consists, its origin, etc. *Nosology* treats of the various sorts of diseases, their origin and symptoms, and strives to arrange diseases according to a scientific classification. *Pathological anatomy* deals with the mechanical alterations and changes of structure. *Therapeutics* is the science of the cure of diseases, often divided into *general*, treating of the subject of cure in general, its character, etc.; and *special*, of the cures of the particular diseases. *Surgery* treats of external diseases and injuries, and the mode of relieving derangements by operative means. *Obstetrics* treats of the modes of facilitating delivery. *Materia medica* is the science of medicines, their external appearance, history, and effects on the human organization. *Pharmacy* teaches how to preserve drugs, etc., and to mix medicines. *Clinics* applies the results of all these sciences at the bedside of the patient.

Medi'na, a city in Arabia, containing the tomb of Mohammed, about 250 mi. n. by w. of Mecca, in the most fertile spot of all Hejaz. The Mosque of the Prophet, which is the only building of importance, contains the sacred tomb, inclosed with a screen of iron filigree. Though the pilgrimage to the tomb is not considered by Mohammedans as an imperative duty, like that to the Kaaba, yet it is estimated that one third of the Mecca pilgrims go on to Medina.

Mediterranean Sea, the great inland sea between Europe, Asia, and Africa, about 22,000 mi. long and 1,200 in extreme breadth. It communicates on the west with the Atlantic Ocean by the Strait of Gibraltar, and on the northeast with the Black Sea through the Sea of Marmora and the Straits of the Dardanelles and Constantinople. It is very irregular in shape, and is divided, near its center, into two distinct and not very unequal portions, an eastern and a western, the latter lying west of Italy, Sicily, and Cape Bon in Africa. The other important subdivisions are the Adriatic Sea or Gulf of Venice, and the Ægean Sea or Archipelago. The largest and most important islands are Sicily, Corsica, and the Balearic Isles, in the west division, and Cyprus, Rhodes, Crete, the Ionian Isles, and Malta, in the east division. The principal rivers which discharge themselves directly into the Mediterranean are the Ebro, Rhone, Po, and Nile. The depth varies from 30 to 2,150 fathoms. Owing to the very narrow channel which connects the Mediterranean with the main ocean, there is very little tide; though on parts of the African coast, etc., a rise of more than 6 ft. sometimes occurs. The Mediterranean abounds with fish, and also furnishes the finest coral and sponges. It is a great highway of traffic.

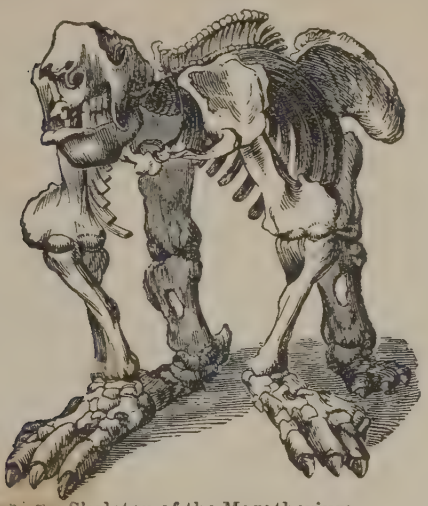
Medul'la, or marrow, in animals, the highly vascular connective tissue, interspersed with adipose or fat-cells, which fills up the hollow shafts or *medullary canals* of long bones, and which forms a center of nourishment for the inner osseous material of which the bone is composed. The *medulla oblongāta* is the upper enlarged portion of the spinal cord, while the *medulla spinālis* is the continuation downward of the brain matter. In vegetable physiology the *medulla* is otherwise known as the *pith*.

Meerschaum (mēr'shum), a hydrated silicate of magnesium, consisting of 60.9 parts silica, 26.1 magnesium, and 12.0 water, occurring as a fine, white, compact clay. It is found in Europe, but more abundantly in Asia Minor, and is manufactured into tobacco pipes.

Meerut' (or Mirat'), a city, cantonment, and administrative center of the Northwest Provinces, India, situated between the Jumna and the Ganges, 36 mi. n.e. of Delhi. It is surrounded by a dilapidated wall enclosing narrow streets and wretchedly built houses. The church is one of the largest in India. Meerut was the scene of the first great outbreak among the Sepoys in 1857. Pop. 99,565. The district of the same name occupies an area of 2,379 sq. mi., and is the most fertile territory in the region known as the Doáb. Pop. 1,313,137.

Megathe'rium, a fossil genus of edentate mammals, allied to the sloths, but having feet adapted for walking on the ground, found in the upper Tertiary or pampas deposits of South America. It was about 8 ft. high, and its body 12 to 18 ft. long. Its teeth prove that it lived on vegetables, and its fore feet, about a yard

in length and armed with gigantic claws, show that roots were its chief objects of search.



Skeleton of the Megatherium.

Mehem'et Ali (1769–1849), viceroy of Egypt, born at Kavala, in Macedonia. He entered the Turkish army, became pasha of Cairo, Alexandria, and subsequently of all Egypt. In 1811 he massacred the Mamelukes to the number of 470 in Cairo, and about 1,200 over the country. He then commenced, by the orders of the Porte, a war of six years' duration against the Wahabees of Arabia, which was brought to a successful conclusion by his son Ibrahim, and secured him the possession of Hejaz. In 1824–27 he assisted the sultan in endeavoring to reduce the Morea, which led to the destruction of his fleet by the allied European powers at Navarino (1827). Subsequently he turned his arms against the sultan, and in his efforts to secure dominion over Syria by armed invasion, he was so far successful that the European powers had to interfere and compel him to sign a treaty in 1839, which gave him the hereditary pashalic of Egypt in lieu of Syria, Candia, and Hejaz.

Meissonier (mā-son-yā), Jean Louis Ernest (1815–1891), French painter, b. in Lyons. He first became known as an illustrator of books, but rapidly became famous for the singular perfection of his art. His pictures, which, whether in genre or portraiture, are almost without exception upon a small scale, are characterized by great minuteness of execution and high finish, but are at the same time not less remarkable for their excellence in composition and breadth of treatment. Among his pictures, which possess an astonishing market value, may be mentioned, *The Smoker*, *La Partie des Boules*, *Napoleon III at Solferino*, *The Cavalry Charge*, and the picture entitled "*1807*."

Mekong (Mekhong, or Cambodia), the longest of all the Indo-Chinese rivers, rises in East Thibet, flows through part of China, Siam, Cambodia, and French Cochin-China, and enters the Chinese Sea by several mouths; length est. 2,700 mi.

Melanchthon (me-langk-thon), Philip (1497–1560), German reformer, b. in Bretten, in the Palatinate. In 1518, at the instigation of Luther and Reuchlin, he was invited by Frederick, elector of Saxony, to fill the chair of Greek in the recently founded University of Wittenberg. In 1519 he accompanied Luther to Leipsic, in order to dispute with Dr. Eck, and in 1521 he published his famous *Loci Communes*, an exposition of Protestant dogmatics, which ran through some sixty editions in his lifetime, and was followed by other influential writings, such as the *Epitŏme Doctrinæ Christianæ* (1524).

Malane'sia, a group of islands stretching from the northeast of New Guinea to the tropic of Capricorn, and including the Admiralty Islands, Solomon Islands, Queen Charlotte or Santa Cruz Islands, New Hebrides, New Caledonia, Loyalty Islands, and the Fiji Islands.

Melbourne, a city of Australia, capital of the state of Victoria, on the Yarra-Yarra, about 2½ mi. from Port Phillip Bay. Melbourne was founded in 1836. It was incorporated in 1842. It occupies an extensive area, which is mostly hilly and undulating, with the Yarra winding through it. The principal streets are about a mile long and 99 ft. wide, and run at right angles to one another, being lined with handsome and substantial edifices. The public buildings are handsome and substantial. Among them the most remarkable are the houses of parliament, the treasury, the law courts, the free library, the mint, the university, etc. There are several public parks, a finely laid-out botanical garden, and a splendid race course. The shipping trade is large, both in exports and imports, the chief of the former being wool, of the latter manufactured goods. Most imports are subject to a heavy duty. By its railway systems Melbourne is connected with all the principal towns of the Australian continent. The chief industrial products are leather, clothing, furniture, flour, ales, cigars, ironware, woolens, etc. A Centennial International Exhibition was held here in 1888 in celebration of the founding in 1788 of the Australian Colonies. Pop. of city proper, 71,550; inclusive of suburbs, 488,999.

Melbourne, William Lamb, Viscount (1779–1848), English statesman; during the ministry of Canning he was secretary for Ireland; in 1830 he became home secretary in the Grey administration; succeeded to the premiership when it was overthrown in 1834 on the Irish question.

Melea'ger, in Greek mythology, the son of Œneus, king of Calydon. He distinguished himself in the Argonautic expedition, and more particularly at the Calydonian hunt, killed the boar, and gave its skin as the highest token of regard to his beloved Atalanta.

Melodrama, originally and strictly, that species of drama in which the declamation of certain passages is interrupted by music, but now the term has come to designate a romantic play, generally of a serious character, in which effect is sought by startling incidents, striking situations, and exaggerated sentiment, aided often by splendid decoration and music.

Melody, in the most general sense of the word any successive connection or series of tones; in a narrower sense, a series of tones which please the ear by their succession and variety; and in a still narrower sense, the particular air or tune of a musical piece.

Melon, a well known plant and fruit. It is an herbaceous, succulent, climbing, or trailing annual, cultivated for its fruit in hot Eastern countries from time immemorial. There are many varieties, as the cantaloupe, which is reckoned the best, Egyptian, Salonica, Persian, etc. The melon, to be raised to perfection, requires the aid of artificial heat and glass throughout every stage of its culture. The *watermelon* is much cultivated in the warmer parts of the world on account of its refreshing juice, which, however, is less sweet than that of the common melon. The *muskmelon* belongs to the same variety.

Melos (now Milos or Milo), an island belonging to Greece, in the Grecian Archipelago, in the s. e. of the Gulf of Ægina, one of the Cyclades. Area 64 sq. mi.; pop. 3,490. In 1820 a peasant discovered here the celebrated statue known as the Venus of Milo, now placed in the museum of the Louvre at Paris.

Melpomene (mel-pom'e-nē), the muse who presides over tragedy. She is generally represented as a young woman, with vine leaves surrounding her head, and holding in her hand a tragic mask.

Melrose, Middlesex co., Mass., 7 mi. n. of Boston. Railroad, Boston & Maine. Industries; large shoe and rubber factories; silver polish and sewing machine needles. Population 1900, 12,962.

Melville Island.—1, An island in the Polar Sea, north of America. Captain Parry discovered it in 1819. 2, An island off the north coast of Australia; area about 1,800 sq. mi.

Memnon, a mythological personage mentioned in the Homeric poems. He slew Antilochus, but was himself slain by Achilles. The name of Memnon was latterly connected with Egypt, and was attached to a statue still standing at Thebes, being one of two known from their size as "the Colossi." This statue, known as "the vocal Memnon," was celebrated in antiquity as emitting a sound every morning at the rising of the sun. Both statues seem originally to have been about 70 feet high.

Memory, the power or the capacity of having what was once present to the senses or the understanding suggested again to the mind, accompanied by a distinct consciousness that it has formerly been present to it; or the faculty of the mind by which it retains the knowledge of past events, or ideas which are past. The word *memory* is not employed uniformly in the same precise sense, but it always expresses some modification of that faculty which enables us to treasure up and preserve for future use the knowledge which we acquire; a faculty which is obviously the great foundation of all intellectual improvement. The word *memory* is sometimes used to express a capacity of retaining knowledge, and sometimes a power of recalling it to our thoughts when we have occasion to apply it to use, the latter being more correctly called *recollection*.

Memphis, an ancient city of Egypt, on the left bank of the Nile, some 20 mi. s. of Cairo, said to have been founded by Menes, the first king of Egypt. It was a large, rich, splendid city, and after the fall of Thebes, the capital of Egypt. The pyramids of Sakkara and the colossal statue of Rameses II, now mutilated and thrown down, are the chief objects of antiquarian interest on the site.

Memphis, county seat of Shelby co., Tenn. It is at the head of navigation for large vessels on the Mississippi river and has excellent railroad facilities. Railroads: Ill. Cent., L. & N., K. C. Ft. S. & M., K. C. M. & B., Yazoo & Miss. Valley, and Ches., O. & S. W. Memphis is the most important commercial center between St. Louis and New Orleans. It is one of the great cotton markets of the country. The manufactures were valued in 1900 at $17,923,059. The most important are lumber and timber and products, cottonseed oil and cake. Pop. 1900, 102,320.

Menam', the chief river of Siam, rising in the Laos country, and flowing generally southward to enter the gulf of Siam below Bangkok; length about 900 mi.

Menan'der (324–291 B.C.), a Greek writer of the new comedy, b. at Athens. He wrote comedies to the number of 100, of which we have only a few fragments remaining. The comedies of Terence were imitated or adapted from Menander.

Mendelssohn-Bartholdy, Felix (1809–1847), distinguished composer, b. at Hamburg. In his ninth year he publicly appeared in Berlin as a musician, and in his sixteenth year he produced the well-known overture to the Midsummer Night's Dream. In 1829 he began an extensive tour through England, Scotland, France, Italy, and on his return to Germany he became musical director in Düsseldorf. Here he tried to establish a theater but without success; and when he left that city in 1835 he became conductor of the famous concerts in the Gewandhaus of Leipsic. In 1841 he was appointed musical director to the King of Saxony; was afterward summoned to Berlin by the King of Prussia to become director of music at the Academy of Arts; and journeyed repeatedly to England, where he conducted his own music at London and Birmingham.

Mendoza, a province of the Argentine Republic on the eastern side of the Andes, area about 54,000 sq. mi. The country is volcanic, the soil fertile but requiring irrigation; chief products: corn, wine, and fruits. Pop. 160,000. The capital, which has the same name, is situated about 2,891 ft. above the sea at the foot of the Cordilleras. It was almost totally destroyed by an earthquake in 1861, over 13,000 lives being lost, but has been rebuilt, and has now about 20,000 inhabitants.

Menela'us, in Greek mythology, son of Atreus, brother of Agamemnon, and husband of the beauteous Helen, with whom he received

the kingdom of Sparta or Lacedæmon. His wife having been abducted by Paris, son of Priam, king of Troy, he summoned the Greek princes to avenge the affront, and himself led sixty ships to the siege of Troy. After its conquest he returned with Helen to his native land in a devious voyage which led him to Cypria, Phœnicia, Egypt, and Libya during a period of eight years.

Menha'den, an American salt-water fish. It belongs to the family Clupeidæ, or herrings, and abounds on the shores of New England. It yields quantities of oil, the refuse being used as manure. It is also preserved in the same way as the sardine.

Menno, Simons (1496–1561), the founder of the sect known as the Mennonites, was b. in Friesland. The Mennonites of the U. S. number about 200,000. There are a number of congregations in Holland, Germany, and Russia.

Menominee, Menominee co., Mich., on Green Bay and Lake Michigan. Railroads: C. & N. W., and Milwaukee & Northern. Industries: It is an important lumbering center, having many saw mills, with an annual capacity of 275,000,000 ft. Pop. 1900, 12,818.

Menomonie, Dunn co., Wis., on Cedar River, 25 mi. n.w. of Eau Claire. Railroads: C. M. & St. P., and C. St. P. M. & O. Industries: large lumber and shingle mills, brick yards, flour mill, etc. Pop. 1900, 5,655.

Mensuration is the practical application of the simpler processes of mathematics to the measurement of the area of a plane figure, or the volume of a solid, the result being expressed in square or cubic inches, feet, yards, etc. The area of any plane rectilineal figure is easily found, since it can always be divided into a certain number of triangles, and the area of every triangle is equal to the base multiplied by half the perpendicular height. If the figure is a parallelogram its area is equal to any side multiplied by the perpendicular distance from this side to the opposite; if a trapezium it is equal to half the sum of two opposite sides multiplied by the perpendicular distance between them. Circumference of a circle=diameter multiplied by 3.14159. Area of a circle=square of radius multiplied by 3.14159=radius multiplied by half circumference. Volume of any rectangular solid=length, breadth, and depth multiplied together.

Mentor, the faithful friend of Ulysses, who entrusted to him the care of his domestic affairs during his absence in the war against Troy. The education of the young Telemachus fell to his charge, and the wise and prudent counsel which he gave the youth has given his name its metaphorical significance.

Menza'leh, a lake or lagoon in Egypt, running parallel to the Mediterranean, from which it is divided by a low-lying slip of land, from 2 to 12 mi. in breadth. It receives the Pelusiac and Tanitic branches of the Nile, and communicates with the sea by three openings. The Suez Canal runs along its eastern extremity.

Mephistoph'eles (older forms Mephistophilus, Mephistophilis), the name of a demon in the old puppet-plays, adopted and developed by Marlowe in his tragical history of Dr. Faustus; and more especially by Goethe in the first part of *Faust*, where he becomes the cultured personification of evil rather than the Satan of popular belief.

Mequinez (mek'i-nez), a city of Morocco, 35 mi. w. of Fez. It is surrounded by a dilapidated wall, and contains a handsome palace, the summer residence of the emperors of Morocco. Pop. about 30,000.

Merca'tor, Gerard (1512–1594), geographer, b. at Rupelmonde, in Flanders. He is the author of a method of projection called by his name, the principles of which were applied practically by Edward Wright in 1599. He is also the author of *Tabulæ Geographicæ*.

Mercator's Projection, a method of projection used in map-making in which the meridians and parallels of latitude cut each other at right angles, and are both represented by straight lines. By means of this projection seamen are enabled to steer by compass in straight lines, and not in the spiral necessitated by the other projections.

Mercier, Honoré, Canadian politician, b. 1840. He studied law, and has been engaged in journalism. He sat in the Dominion Parliament from 1872 till 1874, and became solicitor general in the legislative assembly of Quebec in 1879, and attorney general in 1887.

Mercury, in mythology, the name of a Roman divinity, identified in later times with the Greek Hermēs. As representing Hermēs he was regarded as the son of Jupiter and Maia, and was looked upon as the god of eloquence, of commerce, and of robbers.

Mercury, in astronomy, the planet nearest the sun. He moves round the sun in 87.9693 of our mean solar days, at a mean distance of 35,392,000 mi.; his eccentricity of orbit is 0.205618; the inclination of his orbit to the ecliptic is 7° 0′ 8″.2, his diameter about 3,050 mi. The period of his axial rotation is said to be 24 hours 5 minutes 28 seconds. His volume is about $\frac{1}{17}$ that of the earth; his density $\frac{1}{16}$ greater than the earth's. He is visible to the naked eye in spring and autumn after sunset and before sunrise. Transits of mercury over the sun's disc take place at intervals of 13, 7, 10, 3, 10, 3, etc., years.

Mercury, also called quicksilver, a metal whose specific gravity is greater than that of any other metal, except the platinum metals, gold and tungsten, being 13.56, or thirteen times and a half heavier than water. It is the only metal which is liquid at common temperatures. It freezes at a temperature of 39° or 40° below the zero of Fahrenheit, that is, at a temperature of 71° or 72° below the freezing point of water. Under a heat of 660° it rises in fumes, and is gradually converted into a red oxide. Mercury is used in barometers to ascertain the weight of the atmosphere, and in thermometers to determine the temperature of the air, for which purpose it is well adapted by its expansibility, and the extensive range between its freezing and boiling points. Preparations of this metal are among the most powerful poisons, and are ex-

tensively used as medicines. The preparation called calomel or mercurous chloride is a most efficacious deobstruent. Another valuable preparation is corrosive sublimate or mercuric chloride. From the fluid state in which mercury exists it readily combines with most of the metals, to which, if in sufficient quantity, it imparts a degree of fusibility or softness. An alloy of mercury and any other metal is termed an *amalgam*. Mercury is chiefly found in the state of sulphide, but it is also found native. The chief mines of mercury are in Spain, but it is also found in Germany, Italy, China, California, Borneo, Mexico, and Peru.

Mercy, SISTERS OF, the name given to members of female religious communities founded for the purpose of nursing the sick at their own homes, visiting prisoners, attending lying-in hospitals, superintending the education of females, and the performance of similar acts of charity and mercy. Communities of Sisters of Mercy are now widely distributed over America and Europe.

Meredith, GEORGE, poet and novelist, b. 1828 in Hampshire; educated in Germany; studied for the law, but essayed a literary career with a volume of poems in 1851. This was followed by the *Shaving of Shagpat; Farina, a Legend of Cologne; The Ordeal of Richard Feverel; Evan Harrington; Modern Love; Poems and Ballads*, etc.

Mergui Archipelago, a chain of islands in the Indian Ocean, off the coast of Tenasserim and Lower Siam, the more northern ones forming a part of the district of Mergui. The inhabitants are industrious, but few in number.

Mer'ida, the capital of Yucatan, in Mexico, is situate about 25 mi. from the port of Progreso, on the Mexican gulf, with which it is connected by a railway. It has a Moorish aspect generally, and contains a number of fine squares, a cathedral, bishop's palace, government house, etc. Merida was founded in 1542. Pop. 40,000.

Mer'ida, a town of Venezuela, state of Andes, at the foot of the Sierra Nevada, a well-built place, with a university. Pop. 12,018.

Meriden, New Haven co., Conn. Railroad: N. Y., N. H. & H. Industries: silver plate and britannia ware, gas and electric fixtures, iron foundries and woolen mill. The town was settled in 1638, and became a city in 1867. Pop. 1900, 24,296.

Meridian, one of the innumerable imaginary lines on the surface of the earth that may be conceived of as passing through both poles and through any other given place, and serving to settle the longitude of places and thus to mark their exact position. There are also corresponding lines called *astronomical* or *celestial meridians*, which are imaginary circles of the celestial sphere passing through the poles of the heavens and the zenith of any place on the earth's surface. Every place on the globe has its meridian, and when the sun arrives at this line it is noon or midday. The longitude of a place is its distance—usually stated in degrees, minutes, and seconds—east or west of any meridian selected as a starting point, just as its latitude is its distance north or south of the equator. At a national conference held at Washington, October, 1884, Greenwich was selected as the geographical and astronomical reference meridian of the world, longitude to be reckoned east and west from this up to 180°. It was also arranged that the astronomical day should begin at midnight, Jan. 1, 1885.

Meridian, Lauderdale co., Miss. Railroads: Mobile & Ohio; E. Tennessee; Virginia & Georgia; C. N. O. & T. P. Industries: cotton, furniture, sash and blind factories, foundries, machine shops, and railroad repair shops. Pop. 1900, 14,050.

Mérimée (Mā-ri-mā), PROSPER (1803–1870), French poet and prose writer. He contributed to the *Revue de Paris* and the *Revue des Deux Mondes;* became inspector of historical monuments, in which capacity he traveled through France, and wrote several archæological works, continued to publish romantic tales, such as *Arsène Guillot, Carmen, Colomba*, etc.; was made a senator in 1853, grand officer of the Legion of Honor, 1866. Among his writings were *The History of Don Pedro I of Castile, Poetry of Modern Greece. Lettres à une Inconnue.*

Merino Sheep, a variety of sheep originally peculiar to Spain, but now reared in America, other parts of Europe, Australia, New Zealand, etc. They are raised chiefly for the sake of their long fine wool, the mutton being but little esteemed.

Merle d'Aubigné (merl dō-bēn-yā), JEAN HENRI (1794–1872), historian and theologian, b. at Geneva. His education, commenced at Geneva, was completed at Berlin. He became pastor at Hamburg to a French congregation; and removed afterward to Brussels. Returning to his native city in 1830, he became professor of church history in the theological school founded by the Genevan Evangelical Society. Besides his well-known *History of the Reformation in the Sixteenth Century* (1835–53) he published a supplementary history to the time of Calvin (Paris, 1862–68); *The Protector* (Cromwell), 1847; and the *Recollections of a Swiss Minister.*

Merlin, the *Falco æsalon* or *Hypotriorchis æsalon*, the smallest of European falcons, being only about the size of a blackbird, but very bold. It was formerly used in hawking quails, partridges, larks, and such small game, and is even yet occasionally trained. It is of a bluish ash color above; reddish yellow on the breast and belly, with longitudinal dark spots, the throat of the adult male white. It builds its nest on the ground.

Mermaid and Merman were legendary creatures who lived in the sea, possessed a human body united to the tail of a fish, and who were supposed capable of entering into social relationships with men and women. Under various names they were known over Northern Europe, the typical mermaid being a lovely creature who combs her long beautiful hair with one hand while she holds a looking-glass with the other. The origin of this myth is supposed to rest in the human-like appearance of certain aquatic animals, such as the

seal. The legends of mermaids and mermen have been largely treated in poetry.

Merrill, Lincoln co., Wis., on Wisconsin River, 245 mi. west of Milwaukee. Railroad, C. M. & St. P. Industries: lumber, flour mill, iron foundry, mills, hoop works, brewery, machine works, sash, door, and blind, and other factories. Surrounding country agricultural, grazing, timber, and quarries. The town was first settled in 1844 and became a city in 1881. Pop. 1900, 8,537.

Merrimac, a river in New Hampshire and Massachusetts. The immense water power furnished by its falls has created the towns of Lowell and Lawrence in Massachusetts, and of Nashua and Manchester in New Hampshire.

Merry del Val, Rafael, Cardinal (1865——), b. in London, educated at Brussels and at the Accademia dei Nobile Ecclesiasticci. He became a favorite of Leo XIII, was promoted rapidly and since 1892 has held important positions at the Vatican. He made an important and successful diplomatic visit to Canada in 1897. In 1903 he was appointed Papal secretary of state by Pope Pius X, upon the death of Mgr. Volpini, previously named by Pope Leo XIII.

Merv, an oasis in Central Asia, north of Afghanistan, the principal seat of the Teke-Turcomans, who from this center used to make predatory incursions into Persia and Afghanistan. In 1881 General Skobeleff led a Russian expedition against the Teke-Turcomans, captured their stronghold of Greok Tepe, and received the submission of the people.

Mes'entery, a membrane in the cavity of the abdomen, attached to the lumbar vertebræ posteriorly and to the intestines anteriorly. It is formed of aduplicature of the peritoneum, and contains adipose matter, lacteals, mesenteric glands, lymphatics, and mesenteric arteries, veins, and nerves. Its use is to retain the intestines in a proper position to support vessels, etc.

Meshed, a town of northeastern Persia, capital of the province of Khorasan, 500 mi. northeast of Ispahan. It contains the shrine of Imam Ruza, and is the sacred city of the great Mohammedan sect of the Shiites. The chief manufactures are velvets, sword blades, some silk and cotton goods, and turquoise jewelery. Its situation makes it an important entrepôt of trade. Pop. about 70,000.

Mesmer, Friedrich Anton (1733–1815), German physician, founder of the doctrine of mesmerism or animal magnetism. He professed to cure diseases by stroking with magnets, but about 1776 he renounced their use, and declared that his operations were conducted solely by means of the magnetism peculiar to animal bodies. He went to Paris in 1778, where he achieved considerable success and fame and made many converts to his views, but was regarded by the medical faculty as a charlatan. The government at length appointed a committee of physicians and members of the Academy of Sciences to investigate his pretensions. The report was unfavorable, and the system fell into disrepute. Mesmer retired to Swabia, where he died.

Mesmerism (Animal Magnetism), terms applied to certain peculiar nervous conditions which may be artificially induced, and in which the mind and body of one individual may be peculiarly influenced by another apparently independently of his own will. The term mesmerism is derived from Mesmer, who professed to produce these conditions in others and to cure diseases by the influence of a mysterious occult force residing in himself. This force he called animal magnetism. He held that it pervaded the whole universe, and especially affected the nervous system. The phenomena were known from the earliest ages, when the priests of most of the ancient civilizations affected to cure diseases by the touch of the hand, or threw people into deep sleeps, induced dreams, and produced many of the effects now referred to mesmerism. While the phenomena which Mesmer professed to produce were probably in many cases genuine, his theory of animal magnetism rested on no proper scientific basis. He has been followed by many disciples, whose success in producing the mesmeric condition has left no doubt as to the reality of many of the phenomena of mesmerism; but modern scientific investigation, while not fully explaining all these, has shown that they are due to peculiar nervous conditions, and that it is unnecessary to presuppose any occult force to account for them. The means usually employed to produce the mesmeric condition are such as touching and stroking with the hands, according to rule (manipulation), breathing on the person, fixing the eyes on him, etc. It may also, it is said, be produced by causing the patient to stare at an object, especially a bright one, placed in such a position as to strain the eye, the effect being completed by a few passes of the hand over the face without touching it. In the condition thus induced the patient seems to be in a kind of sleep. The limbs will remain in any position in which they may be placed. By stroking the surface of the body the muscles adjacent may be rendered rigid as in a person suffering from catalepsy. Reason and memory are temporarily suspended, the will is paralyzed, and the subject is irresistibly impelled to act in accordance with suggestion, however absurd. He can be persuaded into any hallucination, such as that he is some one other than himself, or that he hears or sees, smells or tastes, something which has no existence before him. As a therapeutic agent mesmerism has been successfully employed in certain forms of disease, especially in cases of nervous irritation and sleeplessness, and such diseases in general as have a nervous origin. It has been claimed also by professors of the art that the patient when in this condition can determine the nature of any disease from which he may be suffering and the means of its cure, that he can penetrate the mysteries of the future and hold communication with distant persons. But these last statements cannot be regarded as authenticated.

Many theories similar to that of Mesmer

have been propounded to account for these phenomena, e.g., that of the Baron von Reichenbach of the existence of an "influence" developed by certain crystals, the human body, etc., existing throughout the universe, which he called *odyl;* that of electro-biology, which attributes them to electric currents in the human body; and the theories of spiritualism and clairvoyance, which attribute them to spiritual influences. The first step toward scientific investigation of them was taken by James Braid, an English surgeon, who attempted a physiological explanation of them in 1842, and in a work published in 1843 entitled *Neurypnology.* To him we owe the term hypnotism. Scientific investigation has since been devoted to the subject to a considerable extent. It has been recently investigated with great care by Dr. Heidenhain of Breslau, the results of his labors being published in a small work entitled *Animal Magnetism.* He attributes the phenomena to what is known by physiologists as the inhibitory action of the nerves. Such action, he holds, is induced by the process of mesmerizing, and has the result of suspending the action of that portion of the brain which is devoted to voluntary movements, thus putting the patient in a condition in which involuntary movements may be induced by impressions made upon the senses.

Mesne (mēn), in law, middle or intervening. *Mesne process* is defined by Wharton as "all those writs which intervene in the progress of a suit or action between its beginning and end, as contradistinguished from primary and final process."

Mesopota'mia, a name given by the Greeks to an extensive region enclosed by the Tigris and Euphrates, anciently associated with the Assyrian and Babylonian monarchies. This country is inhabited chiefly by Arabs, Kurds, and Armenians. Many of them are nomadic, and their chief occupation is the grazing of cattle. Mesopotamia is now part of the Turkish Empire.

Mesozo'ic Period, the term applied by geologists to the geological period between the Paleozoic and the Cainozoic. It is coextensive with the secondary formations, and includes the rocks of the Triassic, Oolitic, and Cretaceous groups.

Mesquite, a small tree allied to the acacia, common in Mexico, Texas, and other parts of western North America. It yields a gum not much inferior to gum arabic; its seeds are eaten, and a drink is prepared from the mucilage of its pods.

Messe'nia, a country of ancient Greece, in the southern part of the Peloponnesus. Its capital was Messēnē, with the mountain fortress Ithōnē. On its southern coast lay the Messenian Gulf (now the Gulf of Coron). A ridge of Mount Taÿgĕtus separated it from Sparta. Messenia is celebrated for the long struggle of its inhabitants in defense of their liberty with the Lacedæmonians, with whom they waged three wars, the first extending from 743–724 B.C., the second from 685–668 B.C., and the third from 464–456 B.C. Messenia gives name to a nomarchy in modern Greece, with an area of 1,221 sq. mi. and a pop. of 190,000.

Messiah, corresponding to the Greek *Christos* of the New Testament, that is, "anointed," has in the Old Testament several applications, as to the whole Jewish people, to the priests, to the kings, and even to Gentile kings, as persons who had been anointed with holy oil. The designation, however, owes its special importance to the application of it in the prophetic books of the Old Testament to an ideal holy king and deliverer whose advent they foretold. The whole of the prophetic pictures agreed in placing Jehovah in the central place of the desired kingship. These prophecies, which are called the Messianic prophecies, had at the time of our Lord, come to be applied by the Jews to a temporal king who should free them from foreign oppression. They are affirmed by Jesus Christ and his apostles to apply to and be fulfilled in him; and this is the belief of the Christian church, by which he is called "The Messiah." The rationalistic school of theologians assert that Jesus laid claim to the dignity either to meet the preconceptions of his countrymen, or because he felt that the truth which he taught was the real kingdom never to be destoyed which the God of heaven was to set up.

Messi'na, the chief commercial town and seaport of Sicily, capital of the province, and on the strait of same name. The harbor is one of the best in the Mediterranean, and the town is well built. The manufactures consist chiefly of silk goods. The principal exports are silks, olive oil, oranges, lemons, and other fruits; wine, salted fish, lemon juice, essences, etc. Messina possesses a university, founded in 1548, with a public library of 56,000 volumes. The town was founded in the eighth century B.C. Pop. 78,438. The province of Messina has an area of 1,768 sq. mi., and a pop. of 460,024.

Mes'suage, in law, is the term used for a dwelling house with a piece of land attaching, as garden, orchard, etc.; and all other conveniences, as outbuildings, etc., belonging to it. The term is derived from the French *mesuage.*

Meta, a great river of South America, a tributary of the Orinoco, which it joins in Venezuela, though the greater part of its course is in Colombia; length 700 mi.

Met'alloid, in chemistry, a term applied to all the non-metallic elementary substances. The metalloids include oxygen, hydrogen, nitrogen, carbon, chlorine, bromine, iodine, fluorine, sulphur, selenium, phosphorus, boron, and silicon.

Metallurgy (met'al-ėr-ji), the art of working metals, comprehending the whole process of separating them from other matters in the ore, smelting, refining, etc.

Metals. Elementary substances have been divided by chemists into two classes, *metals* and *non-metals* or *metalloids,* but these merge one into the other by gradations so imperceptible that it is impossible to frame a definition which will not either include some non-metallic bodies or exclude some metallic. The term

metal is an ideal type, and is applied to those elementary substances which in the combination of physical characteristics which they present approach more or less nearly to it. The following are the chief characteristics of metals. They are opaque, having a peculiar luster connected with their opacity called *metallic;* insoluble in water; solid, except in one instance, at ordinary temperatures; generally fusible by heat; good conductors of heat and electricity; capable, when in the state of an oxide, of uniting with acids and forming salts; and have the property, when their compounds are submitted to electrolysis, of generally appearing at the negative pole of the battery. Many of the metals are also malleable, or susceptible of being beaten or rolled out into sheets or leaves, and some of them are extremely ductile or capable of being drawn out into wires of great fineness. They are sometimes found native or pure, but more generally combined with oxygen, sulphur, and some other elements, constituting *ores*. The great difference in the malleability of the metals gave rise to the old distinction of *metals* and *semi-metals*, which is now disregarded. The following—fifty-two in number—are the elementary substances usually regarded as metals: aluminium, antimony, barium, beryllium or glucinum, bismuth, cadmium, cæsium, calcium, cerium, chromium, cobalt, columbium or niobium, copper, didymium, erbium, gallium, germanium, gold, indium, iridium, iron, lanthanum, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, osmium, palladium, platinum, potassium, rhodium, rubidium, ruthenium, scandium, silver, sodium, strontium, tantalum, tellurium, terbium, thallium, thorium, tin, titanium, tungsten, uranium, vanadium, yttrium, zinc, zirconium. Of these gold, silver, copper, tin, lead, zinc, platinum, iron, are the most malleable: gold, which possesses the quality in the greatest degree, being capable of being beaten into leaves $\frac{1}{100000}$ of a millimeter in thickness. The following, given in the order of their ductility, are the most ductile: platinum, silver, iron, copper, gold, aluminium, zinc, tin, lead, platinum wire having been obtained of not more than $\frac{1}{1200}$ of a millimeter in diameter. The majority of the useful metals are between seven and eight times heavier than an equal bulk of water; platinum, osmium, and iridium are more than twenty times heavier; while lithium, potassium, and sodium are lighter. The metals become liquid, or otherwise change their condition, at very various temperatures; platinum is hardly fusible at the highest temperature of a furnace: iron melts at a little lower temperature; and silver somewhat lower still; while potassium melts below the boiling point of water, and becomes vapor at a red heat. Mercury is liquid at ordinary temperatures, and freezes only at 39° F. Osmium and tellurium are also regarded by some as non-metals. All the metals, without exception, combine with oxygen, sulphur, and chlorine, forming *oxides*, *sulphides*, and *chlorides*, and many of them also combine with bromine, iodine, and fluorine. Several of the later discovered metals exist in exceedingly minute quantities, and were detected only by spectrum analysis, and there is every likelihood that research in this direction will add to the present list of metals.

Metamor'phic Rocks, in geology, stratified or unstratified rocks of any age whose original texture has been altered and rendered less or more crystalline by subterranean heat, pressure, or chemical agency. The name is given more especially to the lowest and azoic, or non-fossiliferous, stratified rocks, consisting of crystalline schists, and embracing granitoid schist, gneiss, quartz rock, mica schist, and clay slate, most of which were originally deposited from water and crystallized by subsequent agencies. They exhibit for the most part cleavage, crumpling, and foliation, and their lines of stratification are often indistinct or obliterated.

Metamor'phosis, any change of form, shape or structure. In ancient mythology the term is applied to the transformations of human beings into inanimate objects, with which ancient fable abounds. In zoology it includes the alterations which an animal undergoes after its exclusion from the egg or ovum, and which alter extensively the general form and life of the individual. All the changes which are undergone by a butterfly in passing from the fecundated ovum to the imago, or perfect insect, constitute its *development*—each change, from ovum to larva, from larva to pupa, and from pupa to imago, constituting a *metamorphosis*. The occurrence of metamorphosis is by no means confined to the lowest groups of the animal series, for we find the amphibian vertebrates—as in the case of frogs, newts, and their allies—exemplifying these phenomena in a very striking manner. The metamorphoses of the Annulosa, however, including the insects, crustaceans, worms, etc., are among the most marked and familiar with which we are acquainted.

Met'aphor, a figure of speech founded on the resemblance which one object is supposed to bear, in some respect, to another, and by which a word is transferred from an object to which it properly belongs to another in such a manner that a comparison is implied, though not formally expressed. It may be called a simile without any word expressing comparison. Thus, "that man is a fox," is a metaphor; but "that man is like a fox," is a simile. So we say, a man *bridles* his anger; beauty *awakens* love or tender passions; opposition *fires* courage.

Metaphys'ics a word first applied to a certain group of the philosophical dissertations of Aristotle which were placed in a collection of his manuscripts after his treaties on physics. As since employed, it has had various significations, and latterly it has been understood as applying to the science which investigates the ultimate principles that underlie and are presupposed in all being and knowledge. In the part of the Aristotelian treatise alluded to the problems were concerned with the contempla-

tion of being as being, and the attributes which belong to it as such. This implies that things in general must be divided into beings or things as they are, and into phenomena or things as they appear. In modern usage metaphysics is very frequently held as applying to the former division, that is to the ultimate grounds of being. To attain this end it takes into account the correlative of being, that is, knowledge; and of knowledge not as coming within the province of logic or of mental philosophy, but as it is in relation to being or objective reality. In this respect metaphysics is synonymous with ontology. The science has also been considered as synonymous with psychology, and to denote that branch of philosophy which investigates the faculties, operations, and laws of the human mind.

Metastasio, Pietro Bonaventura (1698–1782), Italian poet, b. at Assisi. The lawyer Gravina, who accidentally became acquainted with his talents, took him under his protection, called him, paid great attention to his education, and on his death, in 1717, left him his whole estate. Two years afterward, having spent his fortune, he entered a lawyer's office in Naples. There in 1722 he wrote a serenade for the birthday of the empress which brought him the favor of the Roman prima donna, Marianna Bulgarelli, called *La Romanina*. He resided with La Romanina and her husband in Rome till 1729, and during that time produced many operas, commencing with the *Didone Abbandonata* in 1724. His success was such that Charles VI invited him to Vienna in 1729, and appointed him poet laureate. Metastasio may be said to be the father of the modern Italian opera.

Metazoa (met-a-zō′a), one of the two great sections into which Huxley divides the animal kingdom, the other being the Protozoa. The lowest of the Metazoa are the Porifera or sponges. That portion of the Metazoa which possess a notochord, constitute the sub-kingdom Vertebrata; the rest are invertebrate.

Me′teor, a name originally given to any atmospheric phenomenon; it is now more usually applied to the phenomena known as shooting stars, falling stars, fire balls or bolides, aerolites, meteorolites, meteoric stones, etc. It is generally believed that these phenomena are all of the same nature, and are due to the existence of a great number of bodies, some of them very small indeed, revolving round the sun, which, when they happen to pass through the earth's atmosphere, are heated by friction and become luminous. Under certain circumstances portions of these bodies reach the earth's surface, and these are known as meteorites or meteoric stones. These stones consist of known chemical elements. They have this peculiarity, that whereas native iron is extremely rare among terrestrial minerals, it usually forms a component part in meteorites, and is known as meteoric iron. Exceptionally large showers of meteors appear in August and November every year, and the November showers exhibit a maximum brilliancy every 33 years.

Meteorology, the science or branch of knowledge that treats of atmospheric phenomena relating to weather and climate. The phenomena with which it deals and the instruments used in their observation are mainly these, viz., temperature (thermometer), humidity (hygrometer), atmospheric pressure (barometer), wind (anemometer), rainfall (rain gauge), and clouds. These phenomena are all referable to the action of the sun, and accordingly present variations depending upon locality (including the infinitely varied physical features of different places), the diurnal revolution of the earth upon its axis, and the annual revolution of the earth round the sun. It is the business of meteorology to examine the laws which regulate these variations. It pursues its inquiries in two directions, 1, with reference to the variations observed at different times in the same locality with the view of obtaining average results as to its climate—climatology, and 2, with reference to the variations observed in different localities at the same time with the view of arriving at the laws which regulate the changes in the weather—weather study. In the prosecution of this study observations are taken at the same hour of Greenwich time at a number of stations situated over a large extent of the earth's surface. These observations include readings of barometer, thermometer, hygrometer, rain gauge, anemometer, etc., with non-instrumental observation of clouds. The results which indicate the phenomena existing at that hour at the several stations are tabulated, or registered, formed into weather charts, etc. These charts are made by putting down on a map readings taken at the same moment over a large tract of country, and joining by lines the points where the readings agree. Since the general use of the electric telegraph this branch has assumed great practical importance. By its means observations made at many distant places may be immediately communicated to one center, and men of science are thus enabled to forecast with considerable accuracy the weather which may be expected in certain districts. Such forecasts can be made with great accuracy in tropical and subtropical countries where the atmospheric conditions are very constant, and variations from the average are consequently easily observed. They are attended with much more difficulty in temperate countries. The fact that a storm is traveling eastward may be telegraphed from America, but there is always a chance of its being dissipated or deflected long before it reaches the coasts of Europe. In the U. S., where the majority of storms rise in the district to the west of the Mississippi, and are thus capable of easy observation, great accuracy has been attained. The Weather Bureau originated in 1870, as an attachment to the Signal Service Office of the War Department. In 1891 it was transferred by law to the Department of Agriculture, its functions being closely allied to that interest. Its forecasts of the coming weather seldom extend beyond twenty-four to thirty-six hours in advance, and are telegraphed and published twice daily.

Methylated Spirit, spirit of wine containing 10 per cent. of wood naphtha, which contains a large proportion of methylic alcohol. The naphtha communicates a disagreeable flavor, which renders it unfit for drinking, and for this reason it is admitted duty free. It is of much use in the arts as a solvent for preserving specimens, in manufacture of varnishes, for burning in spirit lamps, etc.

Meter (Mèter) (mā-tr), a French measure of length, equal to 39.37 English inches or 3.28 ft., the standard of linear measure, being the ten-millionth part of the distance from the equator to the North Pole, as ascertained by actual measurement of an arc of the meridian.

Metric System is the name given to any system of weights, measures, or money in which the unit is always multiplied by 10 or some power of 10 to give a higher denomination, and divided by 10 or a power of 10 for a lower denomination. This system has been rigidly carried out in France, and the principle obtains in the coinage of Belgium, Italy, Spain, Portugal, the U. S., and other countries. To express the higher denominations, that is to say, the unit multiplied by 10, 100, 1,000, 10,000, the French make use of the prefixes *déca, hecto, kilo, myria,* derived from the Greek; thus, the *mèter* being the unit of length, *décamèter* is 10 mèters, *hectomèter* 100 mèters, *kilomèter* 1,000 mèters. To express lower denominations, that is, tenths, hundredths, etc., the Latin prefixes *déci, centi, milli* are used in the same way; thus, a *centiliter* is the hundredth part of a *liter, déciliter* the tenth part of a *liter.* The basis of the whole system is the linear measure, the unit of which is the mèter, supposed to be the ten-millionth part of a quadrant of the earth's meridian (39.37 in.) The square of 10 mèters, or square décamèter, called an *arc,* is the unit of surface measure. The cube of the tenth part of the mèter, or cubic décimèter, called a liter, is the unit of liquid capacity. The cube of the mèter, called a *stére,* is the unit of solid measure. The weight of a cubic centimèter of distilled water at 39.2° F. (4° Centigrade), called a *gramme,* is the unit of weight. The unit of money is the *franc,* which is divided into *décimes* and *centimes.*

Met'ronome, an instrument consisting of a weighted pendulum moving on a pivot and set in motion by clock-work; invented about 1814, for the purpose of determining, by its vibrations, the quickness or slowness with which musical compositions are to be executed, so as to mark the time exactly. There is a sliding weight attached to the pendulum rod, by the shifting of which up or down the vibrations may be made slower or quicker. A scale indicates the number of audible beats given per minute, and this must be made to agree with the number attached to the music by its composer.

Metternich (met'tèr-niℏ), Clemens Lothar Wenzel (1773–1859), Prince von Metternich, Austrian statesman. He represented Austria as ambassador at various European courts between 1801 and 1809. In the latter year he became minister of foreign affairs. In 1813, after the French reverses in Russia, Austria gave in her adhesion to the other allied powers, and declared war against France. From this period the policy, not only of Austria, but in a great measure that also of the leading continental powers, was shaped by Metternich. He continued in power till, by the revolution of 1848, he was driven from office, and had to flee to England, where he remained till 1851.

Metz, a town and important fortress of Alsace-Lorraine, on the Moselle, which here divides into several arms, 79 mi. n.w. of Strasburg. The cathedral is a late Gothic structure, surmounted by a spire of open work 397 ft. high. The manufactures consist of woolens, cottons, hosiery, hats, muslin, glue, leather, etc. It was included in the cession of territory to Germany at the peace of 1871, and its fortifications have been greatly strengthened since. Pop. 60,186.

Meurthe-et-Moselle (meurt-ė-mo-zel), a department of Northeast France, formed in 1871 by uniting portions of the old departments of Meurthe and Moselle, in consequence of the cession by France to Prussia of a portion of her territory on the east under the treaty of Frankfort (May 10, 1871); area 2,024 sq. mi. The chief river is the Moselle. The soil is generally fertile. The principal cereals are wheat, oats, and barley. Fruits are extensively grown, and the annual yield of the vines exceeds $4,500,000. The principal mineral products are iron ore and salt. Large quantities of iron and steel are now made. Among manufactures may be mentioned machinery, tools, and other articles of ironware; woolens and cottons; glass, paper, earthenware, leather, etc. The capital is Nancy. Pop. 1891, 444,150.

Meuse, a European river, which rises in France, in the south of the department Haute-Marne, and flows through France, Belgium, and Holland, into the North Sea. Its length is 580 mi. It is navigable for about 460 mi.

Mex'ico (or Mejico) (ma'ℏi-kō), a republic of North America, between the U. S. and Central America, and having on the east the Gulf of Mexico, on the west the Pacific Ocean; area est. at 751,494 sq. mi. Nearly one half of this territory lies within the torrid zone, but the peculiar geological structure of the republic, that of an elevated plateau rising into volcanic peaks, supported by the two branches of the Mexican Cordilleras, the Northeast and Northwest, causes the greatest diversity of climate. The principal summits, all of volcanic origin, are Popocatepetl (Smoking Mountain), 17,884 ft., still indicating its activity by occasional clouds of smoke and ashes; Orizaba, or Citlaltepetl (Star Mountain), 17,373; and Ixtaccihuatl (White Lady), 15,704. All these are above the limit of perpetual snow, which is here about 15,000 ft. The largest river is the Rio Grande del Norte, forming part of the boundary with the U. S., most of the others are rather insignificant. The lakes, which abound, are individually of little importance: some of them have no outlet. Mexico is a country of great natural resources. There is

a vast variety of useful indigenous trees and plants, and many others have been introduced. The principal agricultural products are corn, sisal-hemp, tropical fruits, cotton, coffee, sugar, tobacco, indigo, vanilla, cochineal, etc. Large numbers of cattle are reared, especially in the north. The chief industries (besides agriculture and mining) are the manufacture of cottons and woolens, pottery, tobacco and cigars, leather, soap, sugar refining, brewing and distilling, etc. Mexico is rich in minerals, especially gold and silver, which are far the most valuable of the exports. The Mexican ports on the Atlantic side are most of them insecure, and many of them are mere roadsteads. On the western coast there is, however, a series of magnificent ports, from Acapulco to Guaymas, many of which are scarcely, if at all, frequented. The imports consist chiefly of cotton, woolen, and linen manufactures, wrought iron, and machinery; and the exports of the precious metals, sisal-hemp, coffee, hides, and mahogany and other woods. There are 5,812 mi. of railway open for traffic, 27,861 mi. of telegraph, and 4,174 mi. of telephone. Pop. 1901, 13,750,545.

Administration, etc.— The republic is divided into twenty-seven states; one territory, Lower California; and the Federal District, which comprises Mexico, the capital of the republic, and a small portion of adjoining territory. Population in 1900 was 13,570,545. The proportion of the different races in the population is believed to be 20 per cent. of pure whites, 43 per cent. of mixed race, and the remainder Indians. The Creoles are naturally the dominant race, and the Spanish language is generally spread over Mexico. Roman Catholicism, the state religion of Mexico until 1857, is still the prevailing religion. But there is now no connection between church and state. All religions are tolerated, but no religious body can own landed property. Primary education is compulsory, but the law is not strictly enforced. The schools are supported partly by the central and partly by the state government, and partly by charitable foundations supported by voluntary subscriptions. The present form of government is that of a federal republic, each member of which manages its own internal concerns. The supreme executive power is vested in a president, who has powers very similar to those of the president of the U. S. The revenue usually amounts to $40,000,000; the debt, foreign and domestic, amounts to $113,606,675. There is an army numbering on the peace footing 27,244 men. The annual exports amount to about $60,000,000; the imports, $45,500,000.

History.—Prior to 1521 Mexico was inhabited by an Aztec race and ruled by native emperors. This race had attained a remarkable degree of civilization, and interesting remains of their architecture are existent in the teocallis or pyramids of Cholula, Pueblo, and Papantla. In 1521 Mexico fell into the hands of the Spaniards under Hernando Cortez. Cortez called it *New Spain*, and was created captain general, but in 1535 was displaced by a viceroy. From

that date till 1821 the country was one of the viceroyalties of Spanish America and governed by a series of viceroys possessed of almost absolute power. The spirit of discontent engendered by the selfishness of the Spanish rule manifested itself in open rebellion, when, in 1808 the deposition of King Ferdinand by Napoleon and the unsettled state of affairs in Spain afforded an opportunity. This rebellion begun by a priest, Hidalgo, and continued with more or less vigor till 1821, secured in that year the independence of Mexico. After an unsuccessful attempt to secure a Bourbon prince for the throne, Iturbide, the chief of the insurgents, caused himself to be proclaimed emperor, May 18, 1822, under the title of Augustin I, but was forced to abdicate, March, 1823. A new form of government, on federal republican principles, was then established, the constitution being adopted and proclaimed in 1824. Since the acquisition of its independence Mexico has had a most unsettled history and has been the scene of almost incessant civil wars. The Austrian Archduke Maximilian reigned as emperor from 1864 to 1867. Mexico has been at war with Spain, U. S., allied armies of Spain, France, and England, and with France. In 1871 Juarez was elected president, succeeded by Lerdo de Tejada, who in 1876 was overthrown by Porfirio Diaz, who has shown himself to be an able president, re-elected in 1888, 1892, 1896, and 1900.

Mexico, capital of the republic of Mexico, is situated within the state of Mexico in the Federal District (461 sq. mi.) about 7,400 ft. above the level of the sea, near several lakes. It is situated at about an equal distance from Vera Cruz on the Mexican Gulf, and Acapulco on the Pacific, and is laid out with great regularity. It is on the site of the ancient city of Tenochtitlan, which was destroyed on the capture of Mexico by the Spaniards in 1521. The principal public buildings are the cathedral, about 500 ft. in length and 420 ft. in width, forming one of the sides of the central square; the palace of government; the college of mines, a noble building, but now somewhat dilapidated; the mint, with a front of 360 ft. by 250 in depth, the townhouse, the university, etc. There are numerous convents, hospitals, churches, theaters, etc. The manufactures are of comparatively limited extent, and the trade is mostly in the hands of foreigners. Mexico enjoys a mild climate, and a pure and healthy atmosphere. Pop. 329,535.

Mexico, one of the states of the Mexican republic; area 7,838 sq. mi. It lies in the south of Mexico, and forms an elevated region, one of the best cultivated and most thickly peopled parts of the republic. Its capital is Toluca, but it embraces within its boundaries the city and Federal District of Mexico. Pop. 798,480.

Mexico, Gulf of, a large bay or gulf of the Atlantic, oval in form, and nearly surrounded by a continuous coast line 3,000 mi. in length, of the U. S. and Mexico; estimated area 800,000 sq. mi. It gives name to the Gulf Stream,

which issues from it by the Strait of Florida.

Meyerbeer (mī'ėr-bār), GIACOMO (1791–1864), musical composer, b. in Berlin. He studied under Bernhard Anselm Weber at Berlin, and the Abbé Vogler at Darmstadt. His first two operas, *Jephtha's Daughter* and *Abimelek*, the one produced at Munich and the other at Vienna, having failed, he went to Italy. There he rapidly composed a series of operas in the Italian style, which were generally well received. In 1826 he went to Paris. There he produced *Robert le Diable*, *Les Huguenots*, *Le Prophète*, etc. In these Parisian operas he ceases to be an imitator of the Italians, and it is upon them that his fame as a composer is founded.

Mezzotint, a particular manner of engraving on copper or steel in imitation of painting in Indian ink, the lights and gradations being scraped and burnished out of a prepared dark ground. The surface of the plate is first completely covered with minute incisions, so that it would give in this condition a uniform black impression. The design is then drawn on the face, and the dents are erased from the parts where the lights of the piece are to be, the parts which are to represent shades being left untouched or partially scraped according to the depth of tone.

Miami (mī-ā'mi), a river in Ohio, joining the Ohio below Cincinnati; length 150 mi.

Mica, a mineral of a foliated structure, consisting of thin flexible laminæ or scales, having a shining, pearly, and almost metallic luster. These are sometimes parallel, sometimes interwoven, sometimes wavy or undulated, sometimes representing filaments. The laminæ of mica are easily separated, and are sometimes not more than the 300,000th part of an inch in thickness. The plates are sometimes as large as 18 in. in diameter. They are employed in Russia for window panes, and in that state are called *muscovy-glass*. Mica enters into the composition of the crystalline rocks, as granite, gneiss, mica, schists, chlorites, talcose rocks, and occurs in trappean and volcanic products. It is found also in many sedimentary rocks, as shales and sandstones, giving them their laminated texture. In the latter case, it is derived from the disintegration of the crystalline rocks. It is essentially a silicate of alumina, with which are variously combined small proportions of the silicates of potash, soda, lithia, oxide of iron, oxide of manganese, etc., in accordance with which several species have been constituted, as *common* or *potash mica*, *lithia mica*, *magnesia mica*, *pearl mica*. Regarded as minerals, varieties of mica have received the names of biotite, lepidolite, muscovite, lepidomelane, steatite, etc.

Michael, ST., in Jewish theosophy, the greatest of the angels, one of the seven archangels. In the New Testament he is spoken of as the guardian angel of the church. There is a festival of St. Michael and All Angels in the Western Church held on September 29.

Michael, ST. (or São Miguel), the largest of the Azores, famous for the production of oranges and lemons, of which it exports 120,000 boxes annually. The population is about 115,000; capital, Ponta Delgado.

Michaelmas, the feast of St. Michael the Archangel. It falls on September 29, and is supposed to have been established toward the close of the fifth century. In England, Michaelmas is one of the regular terms for settling rents.

Michelet (mēsh-lā), JULES (1798–1874), a French historian and miscellaneous writer, b. in Paris. In 1821 he was called to the chair of history in the Collége Rollin, where he was also professor of ancient languages and of philosophy till 1826. After the revolution of 1830 he was appointed chief of the historical section of the archives of France, and in 1838 became professor of history at the Collége de France. He lost all his offices at the *coup d'état* in 1851. His principal historical works are: *Histoire de France*, *Histoire de la Révolution Française*, *Histoire Romaine*, etc.

Michigan City, Laporte co., Ind., on Lake Michigan, 56 mi. from Chicago. Railroads: Michigan Central; C. I. & L.; Monon Route (formerly L. N. A. & C.); terminus Indianapolis division of L. E. & W. Industries; car works, railroad shops, woolen mill, chair, sash, door, and blind, boot and shoe, hosiery, bicycle, and barrel factories, and large lumber business. The town was first settled in 1831 and became a city in 1836. Pop. 1900, 14,850.

Michigan, one of the north central states of the U. S., consists of two peninsulas. The upper peninsula is bounded on the n., e., and s. by lakes Superior, Huron, and Michigan, and on the w. by the river of St. Mary and the state of Wisconsin. The lower peninsula is bounded on the w., n., and e. by lakes Michigan, Huron, St. Clair, and Erie, and the St. Clair and Detroit rivers, and on the s. by the states of Ohio and Indiana. The general outline of the lower peninsula approaches that of a horseshoe, with an average width of 200 mi. from east to west, and a length of about 300 mi. from north to south. Its surface gradually rises in gentle undulations from the surrounding lakes to an elevation of about 400 ft. above Lake Huron, no point reaching an altitude of more than 600 ft. The upper peninsula is much more rugged in contour and surface, at some points reaching an elevation of about 1,100 ft. The area of the state is 58,915 sq. mi., and the coast line is not less than 1,600 mi. in length. The state abounds in inland lakes, with areas varying from a few acres to several miles. The rivers are not large enough to be navigable, but they afford ample water power, and are valuable for floating down the logs of the lumbering districts.

Climate.— The relation of Michigan to the Great Lakes and its northern position account for its extreme climate. The mean temperature at Grand Haven and Lansing is 46°. The summers are cool and pleasant, but the winters are severe. The annual rainfall is about 31 in. This is very evenly distributed throughout the year, though a little more than half the amount falls in the five months from May to October. The average snowfall in the cen-

ter of the state is about 4 ft. The winter temperature is much modified by the open water of the adjacent lakes. The severe winds are commonly from the w. and n. w.

Mining.—The leading mineral product is iron; in the amount of ore produced in 1902, Michigan ranked second in the Union, but in the value of products, first. The mines are in three ranges: the Marquette range, of which the most important mines are those of Ishpeming; the Menominee range, of which the principal mine is the Chapin; and the Gogebic range, of which the Norrie is the leading mine. Second in importance are the copper mines, among the richest in the world. The amount of this product in 1900 was exceeded only by that of Montana. The metal is found in the rock as free copper and is separated by crushing and washing. The salt-producing rock underlying the state covers about 8,000 sq. m. and the supply of salt seems inexhaustible. There are extensive gypsum beds in Kent county. Coal exists in the Lower Peninsula, but is of an inferior quality. There are vaat deposits of sandstone of fine quality in the Upper Peninsula.

Agriculture.—The vast pine and hardwood forests of Michigan have constituted the state's most valuable natural resource. But up to 1890, there was an extravagant exploitation of forests; recently, however, considerable interest has been manifested in regard to forestry. The soils of the state are of varied composition and in large areas very fertile. The leading crops are hay, corn, oats, wheat and potatoes. The growth of sugar beets has become an important industry. Michigan is famous for its fine peaches and apples. The apple crop varies from 1,500,000 to 5,000,000 barrels annually. The yearly peach crop is from 500,000 to 1,000,000 bushels. The small fruits and berries are extensively cultivated.

Fisheries.—The fisheries of Michigan yield annually about 35,000,000 pounds of fish. Two-thirds of the catch consists of trout and whitefish, of which Lake Michigan yields nearly half, while the rest is furnished by Lake Superior and Lake Huron.

Manufactures.—The manufacture of lumber and timber products is the leading industry of the state. The most important lumber regions are the Saginaw valley, the Lake Huron shore, Manistee, Muskegon and the Upper Peninsula. The manufacture of flouring and grist mill products ranks second among the industries. Grand Rapids, Detroit, Coldwater and Saginaw are important milling centers. Other industries in the order of their importance are the manufacture of foundry and machine shop products, of furniture, of planing mill products, and of carriages and wagons. In the beet sugar industry, Michigan ranks second in the U. S. The principal manufacturing city in the state is Detroit. Grand Rapids is one of the great furniture centers of the world.

Transportation.—Michigan has a railway mileage of over 8.000. A coast line of over 1,600 miles affords fine facilities for water transportation. The state has a large foreign commerce, chiefly with Canada. The U. S. customs districts and ports of entry are Detroit, Grand Rapids, Port Huron, and Superior. During the calendar year 1900, the imports amounted in value to $5,556,054 and the exports to $32,590,586.

Education.—The sources of the school revenue of Michigan are numerous and the state is amply supplied with public graded and high schools. Besides the State University at Ann Arbor, there is a state normal college at Ypsilanti, and normal schools at Marquette and Mt. Pleasant, a mining school at Houghton, and an agricultural school at Lansing, besides many private denominational colleges. The leading state charitable-educational institutions are the State Public School at Coldwater, the Industrial Home for Girls at Adrian, the Industrial School for Boys and the School for the Blind at Lansing, and the School for the Deaf at Flint. Purely charitable institutions are the state asylums for the insane at Kalamazoo, Pontiac, Traverse City, Newberry and Ionia, and the Home for the Feeble Minded at Lapeer.

History.—Michigan, popularly known as the *Wolverine State*, was until about the middle of the eighteenth century under the government of New France. Jesuit missionaries explored the country in the seventeenth century, but little progress was made in developing the resources of the territory until after the completion of the first half century of the Union. Michigan formed a part of the Northwest Territory, erected in 1787; became a part of the Indiana territory in 1802, was organized as Michigan territory in 1805, and admitted as a state in 1837. On account of unfavorable reports regarding the lands in this section and their fitness for settlement the tide of immigration flowed steadily past Michigan into territories farther west. Within the past few years, however, the increase of the population and growth of wealth have been very rapid. The principal cities with population in 1900 are: Lansing, the capital, 16,485; Detroit, 285,764, Grand Rapids, 87,565; Saginaw, 42,345; Bay City, 27,628; Jackson, 25,780; Kalamazoo, 24,404; Muskegon, 20,818; Port Huron, 19,158; Battle Creek, 18,563; and Manistee, 14,260. The population of the state in 1900 was 2,420,982.

Michigan, Lake, the second largest of the great lakes of North America. It is wholly within the U. S., having the state of Michigan on the east and northwest, Wisconsin and Illinois on the west, and Indiana on the south. On the northeast it communicates with Lake Huron by the narrow strait of Mackinaw. It is 350 mi. long, and on an average 60 mi. broad; area est. at 26,000 sq. mi. The lake is

Michigan, University of, a State institution of learning at Ann Arbor, Michigan, chartered in 1837 and opened in 1841. It has 4,000 students, a faculty of 260 and a library containing 175,000 volumes. Besides the usual academic and professional departments the university offers courses in marine engineering and in training for the consular service. The president is James B. Angell.

Micmacs, a tribe of North American Indians, mostly inhabiting New Brunswick and Nova Scotia, and numbering some 3,600. Their language has been reduced to writing, and a dictionary of it has been compiled.

Microbes. See *Germ Theory.*

Micrometer, an instrument used with a telescope or microscope, for measuring very small distances. Micrometers are variously constructed; but in perhaps the most common form (the *filar micrometer*) the principle of operation is that the instrument moves a fine thread or wire parallel to itself in the plane of the image of an object, formed in the focus of a telescope, the wire or thread being moved by means of delicate screws with graduated heads, so that the distance traversed by the wire can be measured with the greatest precision. The micrometer is of the utmost value to the astronomer, and in trigonometrical surveys, and military and naval operations.

Microphone, an instrument to make faint sounds more audible, invented by Mr. Hughes in 1878. The most sensitive conductor of sound is willow-charcoal, dipped when at white-heat into a bath of mercury. A piece of charcoal, thus prepared placed vertically between two carbon-blocks which are connected with a telephone, is a common form of microphone, and magnifies sounds, otherwise inaudible, enormously.

Microscope, an optical instrument consisting of a lens or combination of lenses which magnifies objects, and thus renders visible minute objects that cannot be seen by the naked eye, or enlarges the apparent magnitude of small visible bodies, so as to enable us to examine their minute texture or structure. For a good microscope an achromatic combination of lenses to form an object-glass and a well-made eye-piece are necessary. The magnifying power of an instrument may be increased by 1, increasing the magnifying power of the object-glass; 2, increasing the power of the eye-piece; 3, increasing the distance between the objective and the eye-piece. The single or simplest form of microscope is nothing more than a lens or sphere of any transparent substance, in the focus of which minute objects are placed. When a microscope consists of two or more lenses, one of which forms an enlarged image of objects, while the rest magnify that image, it is called *a compound microscope.* A *binocular microscope* is a microscope with two tubes starting from a point above the object-glass, which is single, and gradually diverging to fit the eyes of the observer. The rays of light arising from the object under observation are caused to diverge into the two tubes by a prism. A *solar microscope* has a reflector and a condenser connected with it, the former being employed to throw the sun's rays on the latter, by which it is condensed to illuminate the object placed in its focus. A *lucernal microscope* is the same in principle as the solar, except that a lamp is used, instead of the sun, to illuminate the object. When an oxyhydrogen lime light is used it is called an *oxyhydrogen microscope.* By the aid of the most powerful microscope a tube whose side is the four thousandth of a millimeter (the millimeter representing the one-thousandth part of a yard) can be seen.

Middle Ages, a term applied loosely to that period in European history which lies between the ancient and modern civilizations. With some writers the period began when the Western Roman Empire was overthrown by Odoacer in 476; with others when Charlemagne was crowned emperor of the West in 800; while yet others made it begin when the Frankish Empire ended in 843. The end of the period is variously conceived to have closed with the Reformation in Germany; with the discovery of America by Columbus; with the invention of printing; and with the end of the Thirty Years' War in the Peace of Westphalia (1648). The outstanding political events of the Middle Ages include the rise of the German, French, and Italian nationalities; the rise of the Norman power, and the conquest of England by William of Normandy; the Crusades; and the establishment of the Holy Roman (or German) Empire. The feudal system and the power of the papal hierarchy were widespread.

Middleboro, Plymouth co., Mass. Railroad, Old Colony. Industries: straw works, shoe factories, woolen and lumber mills. Pop. 1900, 6,885.

Middlesborough, a river port and municipal and parliamentary borough of England, in the North Riding of Yorkshire, 6 mi. from the mouth of the Tees and 44 mi. n. of York. There are numerous blast furnances and rolling mills, foundries, engineering works, ship yards, nail works, bolt and nut works, etc. Salt is being extensively worked also, there being a thick bed of rock salt at a depth of 1,300 ft. Pop. 75,516.

Middlesex, the metropolitan county of England, one of the smallest in the kingdom, but among the most important, from its containing the greater portion of the city of London; area 181,317 acres. The surface is flat, except the slight eminences, Hampstead, Highgate, and Harrow-on-the-Hill, on the north side of London. Middlesex is divided into seven parliamentary divisions, each returning one member. Pop. 3,251,703.

Middleton, Thomas (1517–1627), English dramatist. He wrote the comedies of *A Trick to Catch the Old One, The Family of Love, The Phœnix, Michaelmas Term, A Mad World my Masters,* and *The Witch,* which is supposed to have suggested some of the witch scenes in Macbeth.

Middletown, county seat Middlesex co., Conn., on Connecticut river, 15 m. s. of Hartford. Railroads: N. Y., N. H. & H.; Connecticut Valley and B. & N. Y. air line. Industries: manufacture of hydraulic machines and pumps, flouring mills, iron foundries, woolen mills and cotton mills. The seat of Wesleyan University. Pop. 1900, 9,589.

Middletown, Orange co., N. Y., 23 mi. s. of Newburgh. Railroads: Ontario & Western; and Susquehanna & Western. Industries: railroad shops, condensed milk co., two iron

foundries, saw, file, hat, type, boiler, shirt, and other factories. Surrounding country agricultural. The town was first settled in 1755 or 1756 and became a city in 1889. Pop. 1900, 14,522.

Middletown, Butler co., O., on Great Miami River, 33 mi. n.w. of Cincinnati. Railroads: C. H. & D.; C. J. & M.; M. & C.; C. & D.; C. C. C. & St. L.; and C. & M. V. T. Co. Industries: tobacco factories, paper mills, iron foundry, flouring mill, and farm implement factory. The town was first settled in 1809 and became a city in 1858. Pop. 1900, 9,215.

Middletown, Dauphin co., Pa., on Susquehanna River, 9 mi. s. of Harrisburg. Railroads: P. & R.; and Pennsylvania. It is located in a lumbering and farming district. Industries: sawmills, iron furnace, iron, stove, tube, paint and chemical works. Population, 1900, 5,608.

Midhat Pasha (1822–1884), a Turkish statesman. He was educated in Constantinople; entered the Turkish civil service; attracted attention by his administrative capacity; became governor of Bulgaria in 1862, and was ultimately in 1876 created grand vizier. In 1881 he was exiled to Arabia, where he died.

Midianites, an Arabian tribe, represented in the Old Testament as the descendants of Midian, son of Abraham by Keturah, and described as engaged at an early period in a commerce with Egypt. They dwelt in the land of Moab, to the southeast of Canaan.

Midnapur, an administrative district of Bengal, forming the most southern part of the Bárdwan division, bounded on the east by the river Hoogli, and with an area of 5,082 sq. mi. Pop. 2,517,802.

Migration of Animals, the phenomenon of certain animals moving, either periodically or at irregular times and seasons, from one locality or region to another, sometimes far distant. Migration has been observed in mammals, birds, fishes, and insects, but it probably occurs in other groups of the animal world, the observation of which is less easy than that of the higher forms. The buffaloes or bisons of North America used, it would seem, to migrate in herds from one place to another. Many fishes (for example, salmon, lampreys, etc.) make periodical journeys from the sea toward fresh-water streams and rivers for the purpose of depositing their eggs. The migratory habits of locusts, and those of certain species of ants, etc., exemplify migration among insects; but among the birds we meet with the best marked instances of migration. With sea birds (for example, puffins), the day of arrival or that on which they appear in certain localities may be prognosticated with perfect safety; and similarly, the day of departure appears in some birds (for example, swifts) to be almost as accurately timed. Storks have been known to return regularly to their old nests, and the same has been observed of swallows. The mode in which birds migrate varies greatly even in the same species of bird. The swallows migrate in bodies comprising vast numbers, and so also do cranes, wild ducks, geese, and many other forms. The migratory flight is generally made against the wind; and certain species of birds, as quails, for instance, appear to wait for favoring winds, and to delay their flight by resting on islands when the wind is unfavorable. Regarding the causes of migration, science cannot at present definitely pronounce. Probably a combination of causes, or different causes in different cases, as scarcity or plenty of food supply, the powerful influences of temperature, and the influence of the breeding season, may contribute to the migratory "instinct." It has been further suggested that this migratory habit or instinct has gradually been acquired since a time when the breeding and feeding grounds of the animals were coincident, these having been gradually separated by climatic and geological changes.

Mil'an, a city of Northern Italy, capital of the province of its own name, situated on the small river Olona, in the middle of the Lombard plain between the Adda and Ticino. The city is entered by eleven gates, several of which are magnificent, and the leading streets proceeding from these gates are tolerably wide, well paved, and lighted. The chief open space is the Piazza d'Armi (Place of Arms), part of which has been made into an amphitheater capable of containing 30,000 spectators. The castle, now a barrack, fronts the Piazza d'Armi on one side; at the opposite side is the Porta Sempione with the fine Arco Sempione or Arco della Pace, built of white marble. Among the public edifices the first place belongs to the Duomo or cathedral, a magnificent structure. It was begun in 1386, and was only completed in 1805. There are many other fine edifices, among them being the Palazzo di Brera or Delle Scienze Lettere ed Arte; and the Ambrosian Library. The chief theater is La Scala, accommodating 3,600 people. The manufactures include silks, cottons, lace, carpets, hats, earthenware, jewelry, etc. The first distinct notice of Milan occurs B. C. 221, when it was subdued by the Romans. In the third century after Christ it ranked next to Rome. It became a republic in 1101, and having refused to submit to the emperor Frederick I, it was destroyed by him in 1162. It was soon rebuilt. Latterly it belonged with Lombardy to Austria, until 1859, when by the Peace of Villafranca Lombardy was ceded to Piedmont. Pop. 414,551.

Mile, a measure of length or distance, and used as an itinerary measure in almost all countries. The English statute mile contains 8 furlongs, each 40 poles or perches, of 5½ yards. The statute mile is therefore 1,760 yards, or 5,280 feet. It is also 80 surveying chains, of 22 yards each. The square mile is 6,400 square chains, or 640 acres. The Roman mile was 1,000 paces, each 5 feet; and a Roman foot being equal to 11.62 modern English inches, it follows that the ancient Roman mile was equal to 1,614 English yards, or very nearly 1⅛ of an English statute mile. The geographical or nautical mile is the sixtieth part of a degree of latitude, or nearly 2,028 yards.

Miles, Nelson A., soldier, was b. in 1839 at

Westminster, Mass. On the outbreak of the Civil War he raised a company of volunteers in defense of the Union, and was always at the front throughout the entire struggle. With peace and a reorganization of the army he became colonel and brevet major-general and in 1896 he became the general commanding the U. S. army. He wrote *Personal Recollections.* Pl. 29, Vol. IV.

Milford, Worcester co., Mass., on Charles River, 16 mi. s.e. of Worcester. Railroads: B. & A.; New England; G. & U.; and two electric street railways. Industries; shoe co., grain mills, iron foundry, elastic fabric, cement and heel factories. Many granite quarries, among them the Milford pink granite. Pop. 1900, 11,376.

Military Schools.—For the U. S. Military Academy, see *West Point.* Other military schools in the U. S. include the Virginia Military Institute at Lexington (founded in 1839), the Kentucky Military Institute (1846) at Farmdale, and the school for subalterns of artillery at Fortress Monroe, in Virginia, for infantry and cavalry officers at Fort Leavenworth, Kansas, and for engineers at Willet's Point. Moreover, there are forty commissioned officers detailed to act as professors of military science and tactics at certain colleges which have received from the U. S. grants of land. In Canada there is a Royal Military College at Kingston (1876). Similar institutions exist in all European countries.

Militia, a body of armed citizens regularly trained, though not in constant service in time of peace. The militia of the U. S. consists of volunteer organizations and all able-bodied male citizens of the age of eighteen and under forty-five, with certain exceptions provided by the national and state laws. See *Army.*

Milk, the secretion peculiar to the females of the class Mammalia, which is secreted in the mammary glands, and which is employed as the nutritive fluid of the young mammal after its birth. Examined by the aid of the microscope, milk is seen to consist of a clear fluid, containing many globules, the average size of which is about $\frac{1}{10000}$ of an inch in diameter, and each appears to consist of oily matter invested by a thin layer of albumin. When churned, the globules in the milk are forced together *en masse,* and form butter. The cream of milk is formed by the globules rising to the top of the milk without coalescing; the "skim-milk," or that left after the cream is formed, being of a pale bluish color, owing to its being deprived of its fatty or oily particles. In itself, milk exhibits the type of a perfect food. The *casein* of milk represents the albuminous or flesh constituents of food; the butter supplies the fatty or oleaginous parts; the water exists as such in milk, while it contains the saccharine constituents in the form of milk-sugar, and the inorganic parts in the form of phosphates of lime and alkaline chlorides, so necessary for the production of bone. The milk of every animal has certain peculiarities which distinguish it from all other milk, but the general properties are the same in all. The specific gravity of milk varies from 1.03 to 1.04. In the making of butter, cream is allowed to stand for some time, during which an acid is generated. It is then put into a churn and agitated, when the butter gradually separates. The *buttermilk,* or that left after the separation of the butter by churning, contains the casein, sugar, etc., of the milk, and the milk left after creaming also contains the greater part of the casein and milk-sugar. Milk may be coagulated by various substances, but *rennet* prepared from the fourth stomach of the calf is generally used for domestic purposes. The result of coagulation is to separate the milk into a thin fluid, or *whey,* and a thick whitish deposit, the *curd.* Whey has a pleasant taste, and contains a large quantity of the milk-sugar, hence it is frequently used as drink, and from its nutritious quality it is administered to delicate people. It is also sometimes made to undergo fermentation by which a very weak spirituous fluid is obtained. Milk is not permitted to be sold which does not contain a fair amount of the proper nutritive constituents. Milk is very liable to be infected with the germs of disease, either from disease in the cow, contamination from unhealthy persons, or the use of infected water in cleaning vessels; and many epidemics of zymotic disease have been traced to impure milk.

Milk, Condensed.—Milk is brought to the factory and placed in large storage tanks from which it is drawn off into copper tanks, each having a capacity of about 1,000 gallons. The milk is brought by steam heat to a boiling point and is then drawn off and strained into the sugar mixer, where the proper proportion of granulated sugar is added. The sugar is the preservative which keeps the milk sweet under all circumstances. The milk is then taken to the vacuum pans where it is boiled down until three-fourths of the water is evaporated. It requires a temperature of 140° to evaporate the milk in the vacuum pans and the reduction is rapid.

The condensed milk, a thick, pasty, cream-colored custard is drawn from the vacuum pans and taken to the coolers from which it is taken to the packing room and put into little tin cans which are hermetically sealed.

Mill, originally a machine for grinding and reducing grain or other substance to fine particles; now applied also to machines for grinding or polishing by circular motion, and especially to complicated machinery for working up raw material and transforming it into a condition in which it is fit for immediate use or for employment in a further stage of manufacture. In the first sense of the word we have *flour mills* and *meal mills, cider mills, coffee mills;* in the second sense we speak of a *lapidary's mill;* and in the third sense we speak of *cotton mills, spinning mills, weaving mills, oil mills, sawmills, bark mills, fulling mills,* etc. The word commonly includes the building for the accommodation of the machinery, as well as the machinery itself. The oldest kind of flour or meal mill was the hand mill or *quern.*

Mill, JAMES (1773–1839), b. at Logie Pert, Forfarshire, Scotland. He began his *History of British India* in 1806 and published it in 1817–18. In consequence of the knowledge which his researches had given him of Indian affairs, he was appointed assistant examiner of correspondence by the East India Company, and soon afterward became chief examiner. He wrote articles on social and political subjects for the *Encyclopedia Britannica;* published a treatise on the *Elements of Political Economy,* and an able *Analysis of the Phenomena of the Human Mind.*

Mill, JOHN STUART (1806–1873), was b. in London. At the age of fourteen he entered upon a course of political economy. His fifteenth year was spent in France; on his return he studied law for a time, and in 1823 obtained a clerkship in the East India House, remaining in the Company's employment till 1858. From 1835 to 1840 he was principal conductor of the *Westminster Review.* In his twenty-first year he edited Bentham's work *On Evidence.* In 1843 appeared the first of his two chief works, *A System of Logic, Ratiocinative, and Inductive,* the second being *Principles of Political Economy,* (1848). To these he afterward added his work *On Liberty; Thoughts on Parliamentary Reform; Utilitarianism;* the *Examination of Sir William Hamilton's Philosophy;* and a *Study of Auguste Comte and Positivism.* In 1865 he was returned to Parliament as member of Westminster. Mill's works on logic and political economy are standard text-books.

Millais (mil'ās), SIR JOHN EVERETT, BART., R. A., b. at Southampton, 1829. In his earlier days he was a leader of the Pre-Raphaelite School, but on attaining maturity in art he abandoned the peculiarities for which the school is noted. As the result of this new departure Millais painted such pictures as *Ferdinand Lured by Ariel, Mariana in the Moated Grange, The Huguenot Lovers, The Black Brunswicker,* and *Ophelia,* while its influence was also apparent in his landscapes. In portraiture he held first rank, and painted a number of the most distinguished men of his day. He was made a baronet in 1885, and was decorated with the Legion of Honor. D. 1896.

Millau (Mē-yō), a town of Southern France, department of Aveyron, 31 mi. s.e. of Rodez. It has coal mines, manufactures of leather, leather gloves, silk mills, etc. Pop. 14,417.

Milledgeville (mil'ej-vil), a town in Georgia, formerly capital of the state, 145 mi. n.w. of Savannah, on the Oconee. Pop. 1900, 4,219.

Miller, HUGH (1802–1856), geologist, was b. at Cromarty, and became a stone mason. While working at his trade he studied literature, wrote a great deal, and in particular became a proficient in geology.

Miller, JOAQUIN, the pen name of Cincinnatus Heine Miller, b. 1847 in Indiana; spent some time in the Californian mining districts; lived with the Modoc Indians for five years; edited a newspaper called the *Democratic Register;* studied law and was called to the bar in Oregon, and became district judge in Canyon City, subsequently settled in New York. He has written *Pacific Poems, Songs of the Sierras, Songs of the Sun Lands, Ship in the Desert,* besides novels and dramas.

Millett, a common name for various species of cereals yielding abundance of small seeds, cultivated in the U. S., the East Indies, China, Arabia, Syria, Egypt, etc. The leaves and panicles are given both green and dried as fodder to cattle. German millet is cultivated on account of its seeds, which are used as food for cage birds. See colored plate. Grains—Wheat.

a.—Common Millet. *b.*—German Millet.

Millet (mi-lā'), JEAN FRANÇOIS (1814–1875), French artist, b. at Gruchy, near Cherbourg. He worked with his peasant father in the fields; studied drawing at the academy of Cherbourg; from thence passed with an allowance from this town to the atelier of Delaroche in Paris, and exhibited at the Salon in 1840. As a student and until the death of his first wife in 1844 he was frequently in the greatest poverty, and his life subsequently was by no means free from difficulty. In 1849 he left Paris and settled among the peasants of Barbizon, on the edge of Fontainebleau Forest, and devoted himself to transferring their simple everyday life to his canvases, which he did with great truth of sentiment and subdued poetic charm. Of his paintings may be mentioned *The Sheep Shearers, The Gleaners, The Sower, The Shepherdess with Her Flock,* and *The Angelus.* The last was sold by auction in Paris in 1889 for about $115,000.

Millville, Cumberland co., N. J., head of navigation on Maurice River, 41 mi. s.e. of Philadelphia. Railroad. W. Jersey. Exports fish and produce. Has a cotton mill and glass factories. Pop. 1900, 10,583.

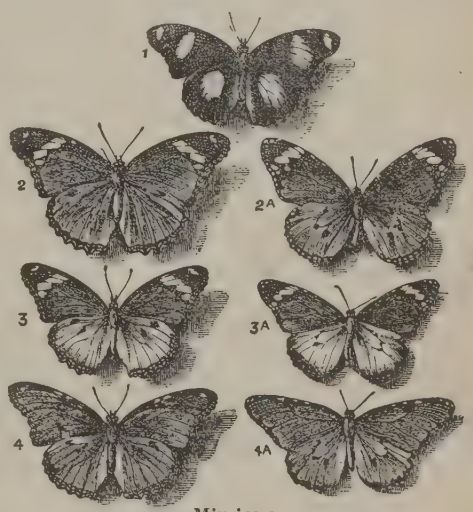
Miltiades (-dēz), an Athenian general of the fifth century B.C. When Greece was invaded by the Persians he was elected one of the ten generals, and drew up the army on the field of Marathon, where, B.C. 490, he gained a memorable victory. Next year he persuaded the Greeks to entrust him with a fleet of seventy vessels, in order to follow up his success. With this, to gratify a private revenge, he attacked the island of Paros, but was repulsed and dangerously wounded. On his return to Athens he was impeached, and condemned to pay a fine of fifty talents. Being unable to pay he was thrown into prison, where he soon after died of his wound.

Milton, JOHN (1608–1674), English poet, was b. in London. At the age of seventeen he entered Christ's College, Cambridge, where he resided for seven years. Leaving the university he went to reside with his father, who had retired to Horton in Buckinghamshire, and here he remained for six years. In this leisured retreat he studied classical literature, philosophy, mathematics, and music. In 1637 on the death of his mother, he made a continental journey, in which he visited Paris, where he was introduced to Grotius; Florence, where he met Galileo; Rome and Naples. After remaining abroad for fifteen months he returned to England. The home at Horton having been broken up, Milton settled in the metropolis, and undertook the education of his two nephews, the sons of his sister, Mrs. Phillips, and to these, betimes, were added the sons of a few personal friends who boarded or received daily lessons at his house in Aldergate street. While settled here his *Paradise Lost* was partially sketched out, but the immediate fruits of his pen were vigorous polemical treatises. In the summer of 1643 Milton married Mary Powell, the daughter of a royalist family. She found his habits austere and his house dull, with the result that she returned to her father about a month after marriage. In the end, however, his wife returned in 1645, bore him three daughters, and continued to live with him until her death in 1653. When in 1649 Charles I was executed and a republic established, Milton avowed his adherence to it in his pamphlet, *Tenure of Kings and Magistrates*, and was appointed foreign secretary to the commonwealth. In his literary work his eyesight suffered so much that in 1652 he became totally blind. Nevertheless he continued Latin secretary with the assistance of Andrew Marvell, and dictated some of Cromwell's most important dispatches. When Charles II was restored a few months later, the blind politician remained in hiding, his books were burned by the common hangman, and he himself narrowly escaped the scaffold. He had married a second wife in 1656, who fifteen months after had died in childbirth; in 1663 he married a third time, and began the writing of *Paradise Lost*. This was published in 1667. In two years a second edition was printed, and Milton's position as the greatest poet of his time was established. In 1670 there appeared his *History of Britain to the Norman Conquest*, and in the following year the continued vigor of his poetic faculty was shown in *Paradise Regained* and *Samson Agonistes*. Pl. 33, Vol. IV.

Milton, Northumberland co., Pa., on Susquehanna River. Railroads: P. & R., and Pennsylvania. It is located in an agricultural district. Industries: steel and iron works, net, fly, nail, car, pump, and wood-working machinery factories, etc. Pop. 1900, 6,175.

Milwaukee, Milwaukee co., Wis., on Lake Michigan, at the mouth of the Milwaukee River, 90 mi. n. of Chicago. Railroads: C. & N. W.; Milwaukee & Northern; C. M. &. St. P.; Wisconsin Central; M. L. S. & W. It is the largest city in the state, the chief port of entry, seat of a state normal school, an industrial school for girls, and, in the vicinity, a national soldiers' home. Numerous and extensive manufacturing interests are located here, including rolling mills employing 2 000 men, machine shops employing 1,500 men: flouring mills and breweries; also knit goods, lumber, leather, boot and shoe, carriage, furniture, cigar and tobacco factories. Milwaukee has a good harbor and a large shipping trade, being one of the greatest grain markets in the world. It ships over 9,000,000 bushels of grain annually, besides large quantities of lumber, tanned goods and beer. Pop. 1900, 285,315.

Mimicry, the name given to that condition or phenomenon which consists in certain plants and animals exhibiting a wonderful resemblançe to certain other plants or animals, or to the natural objects in the midst of which they live. This peculiar characteristic is generally the chief means of protection the animal has against its enemies. It is well seen in the leaf insects and in the "walking stick" insects. Certain tropical butterflies reproduce



Mimicry.

the appearance of leaves so closely that even the parasitic fungi which grow upon the leaves are imitated. So also a South American moth has a most accurate resemblance to a humming-bird; while the cacti of America and the euphorbias of Africa might easily be mistaken for each other, though widely different in structural characters. The theoretical explanation of this mimetic quality is attributed by recent biologists to purposes of self-preservation. Thus, the form or color which enables an animal to seize its prey easily and to protect its own life by deceptive resemblance to other objects, is conceived to be that form and color which is most likely to survive. The term is used in merely a metaphorical sense, and implies no act of volition on the part of the animal or plant.

Minas Geraes (mē'nàs je-rä'es), the most populous province of Brazil, bounded by Bahia,

Espirito Santo, Rio de Janeiro, São Paulo, and Goyaz; area 246,700 sq. mi. It forms a high plateau varied by hills, and the climate is temperate and healthy, except along the swampy riversides. It is rich in minerals; sugar cane, cotton, millet, tobacco, and coffee are cultivated; timber is abundant. The chief town is Ouro-Preto. Pop. 2,018,807.

Mind, a term that admits of no exhaustive scientific definition, but may be said to indicate, generally, the power possessed by each of us in virtue of which we know, think, feel, and will. Limited to the individual, and verifiable only through individual experience, its phenomena have long been held to represent the immaterial as distinguished from the material world, *mind* and *matter* forming thus a direct antithesis. Yet we have no experience of mind as apart from matter, and many, instead of regarding mind as a separate entity, hold it rather to be akin to some function of the nervous system. The mental powers or functions are generally classed as three—intellect or understanding, emotion or feeling, and volition or will. Sometimes the term mind is specially given to the first (the intellect), which itself possesses several powers or capacities, such as perception, memory, reasoning, imagination. It is by the intellect that we acquire knowledge, investigate phenomena, and combine means to ends, etc.; but the ultimate analysis of our mental powers gives different results with different investigators, the classification of the faculties of the mind being thus very various. The science that has specially to do with the investigation of mental phenomena is generally known as psychology.

Mindana'o, one of the Philippine Islands, next to Luzon in point of size, about 300 mi. long and 150 broad; area 34,250 sq. mi. Nearly the whole of the island excepting the extreme northern portion is under native rulers, of whom the Sultan of Mindanao is the chief. All the country, except upon the seacoast, is mountainous, the volcano of Apo being 8,819 ft. high. Some coffee, cocoa, and cotton are exported. The chief town is Zamboanga or Samboangan, a port and naval station at its western extremity; Spanish pop. est. at 50,000; total of the island at 845,000.

Mindo'ro, one of the larger of the Philippine Islands, situated south of Luzon, from which it is separated by the Strait of Manilla; about 110 mi. long by about 53 broad. It is evidently volcanic, the climate is hot, and the rain almost incessant. Rice, cacao, and wild cinnamon are among the products. Pop. 61,900.

Mineral'ogy, the science which treats of the properties of mineral substances, and teaches us to characterize, distinguish, and classify them according to their properties. It comprehends the study or science of all inorganic substances in the earth or on its surface. As distinguished from geology, mineralogy deals with the various mineral bodies as separate constituents of the earth's crust, and examines their properties as such, while geology treats them in the aggregate, as building up the crust of the earth, and as forming masses and presenting phenomena that have a history to be investigated. Minerals may be described and classified either in accordance with their chemical composition, their crystallographic forms, or their physical properties of hardness, fracture, color, luster, etc., or a combination of all, and thus various systems of classification have been adopted. Most minerals crystallize in definite forms, and this form is one of the chief characteristics of many mineral species. There are not a few, however, which are not distinctly crystalline, but are earthy or occur in masses; the latter exhibiting important varieties of structure, as *laminated, fibrous, granular, reniform, botryoidal,* etc. Other distinctive characteristics are *color,* which, however, varies even in the same mineral; *luster,* the character of the light reflected from the surface, and described as *adamantine, vitreous, nacreous, greasy, silky,* etc.; *fracture,* or the character of the freshly-broken surface; *streak,* or the appearance and color of a furrow made in the mineral by a hard-tempered knife or file; and *hardness,* which is now determined by what is called Mohs's scale. In this scale certain minerals are represented by numbers from 1 to 10, viz.: 1, *talc,* common laminated light-green variety; 2, *gypsum,* a crystallized variety; 2.5, *mica;* 3, *calcite,* transparent variety; 4, *fluorspar,* crystalline variety; 5, *apatite,* transparent variety; 5.5, *scapolite,* crystalline variety; 6, *potash feldspar,* white cleavable variety; 7, *quartz,* transparent; 8, *topaz,* transparent; 9, *corondum;* 10, *diamond.* To determine the hardness of a mineral, it is ascertained by experiment which of these it will scratch and which will scratch it; thus if a mineral will scratch fluorspar but not apatite, while the latter will scratch it, its hardness is between 4 and 5. Diaphaneity, refraction, polarization, electric properties, etc., are all distinguishing marks. In the classification of minerals, their chemical composition, though not to be regarded by itself, is of much importance. Among famous names in connection with mineralogy may be noted those of Werner, Haüy, Mohs, Dana, etc.

Mineral Waters is the term commonly applied to the spring waters that contain an unusual quantity of such substances as sodium, magnesia, iron, carbonic acid, and sulphur; but it cannot be used in any absolute fashion. It has not been found practical or useful to classify mineral waters under their chemical elements, but the attempt has been made, as where the springs are described as salt, earthy, sulphur, iron, alkaline, and alkaline-saline. Besides the substances which these terms indicate, the waters are frequently impregnated with carbonic acid gas.

Mineral Wool, a substance which is produced from the vitreous liquid slag of a blast furnace drawn out into fine fibers under pressure of steam. The slag, when in a molten condition, is driven by the steam from the furnace through a crescent-shaped aperture, and suddenly cools into long, fibrous filaments. The thin, glassy, thread-like substance thus produced is useful as a non-conductor of heat,

and it has, therefore, been largely employed as a covering for boilers and steam pipes, to prevent the freezing of water in pipes, etc.

Minerva, a daughter of Jupiter, and one of the great divinities of the ancient Romans. She was looked upon as the patroness of all arts and trades, and her annual festival, called Quinquatrus, lasted from the 19th to the 23d of March inclusive. This goddess was believed to protect warriors in battle, and to her was ascribed the invention of numbers, and of musical instruments, especially wind instruments. At Rome a temple was built for Minerva, by Tarquin on the Capitol, where she was worshiped along with Jupiter and Juno; and there was also a temple on the Aventine dedicated to herself alone.

Minho (min'yō) (more fully Entre Douro e Minho), a province of Portugal, bounded on the n. by the river Minho, s. by the Douro, and w. by the Atlantic; area 2,706 sq. mi. The surface is generally mountainous. The most important products are wine, flax, cork, and oranges. Pop. 1,014,768.

Mining.—The art of mining comprehends all the processes whereby the useful minerals are obtained from their natural localities beneath the surface of the earth, and the subsequent operations by which many of them must be prepared for the purposes of the metallurgist. The art has been practiced from the remotest times. It is referred to in the 28th chapter of the book of Job; and an Egyptian papyrus, drawn in 1400 B. C., preserved in the museum at Turin, depicts the workings of a gold mine. The first writer who treated mining systematically was Georgius Agricola. In 1556 he published in Latin an exhaustive treatise on the subject. The introduction of gunpowder as a blasting agent in 1620 completely changed the conditions under which mining had up to that time been carried on, and the enlarged scale on which mining operations are now conducted has led to the invention of new methods of working, and to the introduction of machines of greater precision and power.

All mineral deposits are divided into two very broad divisions. The first includes the beds or seams of iron ore, coal, and salt. These are deposits laid out more or less horizontally and parallel to the stratification of the surrounding rocks. The second class includes mineral veins or lodes. Various names have been given to these deposits. In the British colonies, for example, they are termed reefs, a somewhat misleading name. A lode may be defined as a repository of mineral matter which fills more or less completely a former fissure in the earth's surface. The mining appliances employed are very different in the two classes of deposits. In the first class, it is desirable to make a hole of the shortest possible depth from the surface of the ground to the bed of mineral. A shaft is therefore sunk through valueless beds until the mineral is reached. Machinery of the best class is then used to extract the whole of the mineral, due precautions being taken to avoid danger from falls of roof and from noxious gases. In the second class of deposits, the inclination of the mineral vein has to be taken into account, as the deposit varies considerably in inclination and in size. The vein must therefore be studied foot by foot downward from the top. The miner does not look favorably on vertical veins. Certainly in most cases it would appear that the chance of vertical lodes being productive is much less than in inclined ones. In some cases a vertical shaft is sunk, and passages, known as crosscuts, are driven from this to the vein at different levels. A vertical shaft presents the advantages of greater ease in sinking, hauling, and pumping. In the search for mineral deposits, the best evidence is obtained by putting down bore holes. These are made by various methods, and are put down to a depth of a few feet when required for testing the character of the foundation subsoil, or, in other cases, to thousands of feet when required in seeking for or estimating the value of deposits of coal, salt, and ironstone. Ages ago bore holes were put down by the Chinese to a depth of 3,000 ft.

In order to open up a mine, tunnels or entries are driven on the lode or to cut it whenever the contour of the country allows it. Shaft sinking involves a larger outlay of capital and greater working costs. In the ordinary method of sinking shafts, the workmen, standing upon the bottom of the pit, blast out the rock, and send the excavated material to the surface by means of an engine, rope, and bucket. The sides of the shaft are supported by timbering or walling.

An ingenious process of sinking through quicksand consists in freezing the water contained in that portion of the water-bearing ground which occupies the position of the intended shaft into a solid mass of ice, and then sinking through it by hand without having to pump any water. See *Ice, artificial.* This method has proved successful at several European collieries, and at the Chapin iron mine in Michigan. The average depth of coal mines before the introduction of the steam engine did not exceed 100 yards, while a near approximation for the present time would be 400 yards. The deepest shaft in Great Britain is that of the Ashton Moss colliery, near Manchester, which has attained a depth of 2,850 ft. The seams dip at the rate of 9 in. per yard, so that parts of the workings are 3,000 ft. deep. The deepest shaft in the world was until recently that of a silver-lead mine in Bohemia, at Przibram, where the Adelbert shaft is 3,432 ft. in depth. This depth has, however, been exceeded in the Lake Superior copper-mining district, where in 1890 the Calumet shaft attained a depth of 3,900 ft.

The cutting of a path through the harder rocks, as carried on by the ancient miners, was particularly laborious. The work was executed in confined spaces, and a large amount of dust was produced. The miners' vocation was excessively unhealthy, inasmuch as they were obliged to inhale large quantities of dust; and thus became subject to disorders of the

Mining

lungs to which they fell victims at an early age. Previous to the introduction of blasting the implements used were of the nature of wedges and hammers. Bit by bit pieces of rock were broken away, the operation being aided by natural fissures in the rock and by the brittleness of the hard material. In this way the ancient miners cut coffin-shaped galleries 5 ft. in height. At the present time the galleries or levels are usually 7½ ft. high and 5 ft. wide, thus affording great facility for traveling and for ventilation. In the operation of blasting use is made of a drill of steel. This is struck with a hammer. A borer of larger diameter may be used, held by one man and struck by another. Rock drills driven by steam or by compressed air and electricity have come largely into use. The bore hole, when finished, is then charged. The gunpowder is enclosed in a little bag of cloth dipped in pitch and provided with a fuse. Instead of using a cartridge of this kind, clay may be forced down the hole by a claying bar so as to shut off feeders of water, and the hole will be dry enough to receive a charge of powder. A needle of iron or steel is placed in the middle of the charge with the ring at its end protruding, and tamping is introduced. For this purpose it is best to put in clay piecemeal until the whole is filled up. Accidents may happen by pushing down the iron bar, which is apt to strike fire against the hard rock. A second suspected cause is that when a man takes a tamping bar and strikes it with a hammer, the air is compressed, and the temperature augmented sufficiently to explode the powder. The older fuse consisted of carefully selected straws filled with fine powder. The safety-fuse is of cotton with gunpowder in the middle. For use in wet ground it is covered with a waterproof composition. Considerable attention has been paid to the subject of consolidating the charge. Excellent work has been done with compressed powder; dynamite has become quite indispensable; and guncotton is also employed, the best form being the compressed variety invented by Abel. Nitrated guncotton or tonite has also given admirable results. The fullest benefit of these modern explosives can only be obtained by the use of strong detonators fired by electricity, by which it is possible to place a number of bore holes in such a manner that when fired simultaneously they shall help each other. For removing coal these high explosives are too quick in their action, and blasting powder continues to be used. Millions of tons of coal are still obtained by its aid. In order to obviate the danger of explosions in fiery collieries, many ingenious substitutes for blasting have been proposed. For example, a hole is bored, and wedges inserted to force down the coal which has previously been undercut with a pick. Another plan is that in which cartridges of caustic lime are employed, water being forced into them by a force pump. The pressure of steam generated by the usual charge of seven cartridges is 2,850 lbs., the cartridges themselves expanding to about five times their original size. The work of the miner engaged in undercutting the coal-seam is very arduous, and various coal-cutting machines have been invented with a view to lessen the labor and expense. They work with compressed air or electricity, and have the cutters arranged on the periphery of a rotating disk, or on a traveling pitch-chain. Though largely employed in America, they have not yet come into extensive use in Great Britain. The coal, when broken down, is placed in cars, and drawn by horses, or engine-power, or electric motors, to the bottom of the shaft and raised to the surface.

The actual mode of working the coal, although varying greatly in every district, may be broadly divided into room and pillar method, where the first stage of excavation is accomplished with the roof sustained by coal; the long-wall method, where the whole of the coal is allowed to settle behind the miners, no sustaining pillars of coal being left. The latter method, when well planned, is the safer both as regards facility of ventilation and less liability to accidents from falls. In thick and highly inclined beds it is usual to remove the coal by horizontal slices, and to fill the excavation with waste material. In some instances blast furnace slag is used for the purpose. The mode of working metalliferous veins differs greatly from that followed in the case of the more or less horizontal coal beds. Horizontal galleries, termed levels, are driven upon the lode usually ten fathoms (60 ft.) apart. They are rarely perpendicularly above one another, as they follow the inclination of the vein. The levels are connected by means of small shafts, termed winzes. Represented on a vertical plane, the vein will thus be seen to cut up into pillars, which are worked by the method of stoping. Of this there are two varieties, underhand and overhand stoping. In the former the ore is gradually worked away downward from the floor of one level, the ore and worthless mineral being taken out through the level next below. In most districts underhand stoping has been superseded by the more economical overhand method, in which the miners stand on timber platforms and break down the mineral above them. The great depth and size of modern collieries necessitate the raising of greater quantities of coal through a single shaft than was ever contemplated in former times. The winding engines of modern erection are consequently of extraordinary power. Thus, engines have cylinders with a diameter of 54 in., and are capable of raising six tons of coal, or, with ropes and the cages containing the coal trucks, a total load of 15½ tons, at a speed of 32 ft. per second. The quantities which can thus be raised are enormous. It is by no means uncommon for 900 to 1,400 tons to be raised from one pit in the day. In collieries both coal and men are raised in the cages, but in the metalliferous mines the man-engine is largely used. This consists of a reciprocating rod or pair of rods fitted with steps, by which the miner is raised 8 to 14 ft. at a stroke.

Although this method obviates the tax on the energies of the men entailed by the climbing of ladders, it is by no means free from danger. Prussian statistics show that where man-engines are employed there are four times as many accidents as where cages and ropes or when ladders are used. At the Epinac collieries in France a remarkable pneumatic system of raising coal and men is employed. An air-tight, wrought-iron tube, 5 ft. 3 in. in diameter, is placed in the shaft and fitted with a piston cage carrying nine coal wagons. The air being exhausted above the piston, a load of three tons of coal is raised at a rate of 19 in. per second. The great cost of the installation has prevented the method from being generally adopted. In almost all mines the surrounding rock contains water, which rapidly accumulates in the workings. Where the contour of the district is suitable, the best means of draining the mine is by means of an adit-level, i. e., a tunnel driven in the hillside. In some cases extensive areas are drained by adits.

The ventilation of subterranean workings is a problem of the greatest importance. The air is contaminated by the respiration of men and horses, by the combustion of lights, by the smoke of explosives, and by deleterious gas; added to which, in the case of collieries, the insidious fire damp, or carbureted hydrogen, exudes from the coal. Mingled with air this gas forms the explosive mixture to which so many miners owe their death. It is obvious that the ventilating current must be sufficient to dilute this mixture below the firing point and to sweep it away. The general mode of ventilating a colliery is to have two shafts, a downcast and an upcast. The pure air entering by the downcast shaft traverses the roadways of the colliery. By means of doors and stoppings, the current is caused to travel in the required direction so as to reach the innermost workings of the mine. It then passes to the upcast shaft and returns to the surface. The motion of the air-current is caused by furnaces or by mechanical ventilators. In the former case, a large furnace is kept burning at the bottom of the upcast shaft, the air in which it heats and causes to expand. In this way a volume of air is obtained suitable for very extensive workings, as much as 120,000 to 250,000 cubic feet of air being passed through the shafts per minute. In the case of mechanical ventilators, the vitiated air is withdrawn from the colliery by the exhausting action of centrifugal fans, which may be made either of large diameter to run at low velocity, or of small diameter to run at high velocity. At several important collieries these fans attain enormous dimensions, in some cases as much as 45 ft. in diameter and 14 ft. in width. Almost as important as ventilation in relation to the safety of human life is the accurate construction and preservation of mine plans. In many cases the plans are laid down without any reference to the phenomenon of the variation of the magnetic needle. Trusting to old plans constructed in this way, the miner may drive straight into old workings filled with water, the tapping of which would be death to all employed in the colliery.

Ministers, FOREIGN, are those accredited representatives which one country sends to another. Generally they are divided into three classes. The highest in rank is the *ambassador extraordinary*, who can claim to represent his state or sovereign in his own person, and receive honors and enjoy privileges accordingly. The *legates* and *nuncios* of the pope also belong to this class. *Envoys extraordinary*, *internuncios*, and *ministers plenipotentiary* belong to the second class, and neither hold the same degree of power nor receive the same distinction as the former. The third class includes *ministers resident*, *envoys* and *charges d'affaires*. Persons who are sent merely to conduct the private affairs of their monarch or his subjects in a foreign place are called *agents* or *residents;* when occupied chiefly with subjects of a commercial character, they are called *consuls*.

Mink, an American and European quadruped, allied to the polecat. It is semi-aquatic, burrowing on the banks of rivers and ponds, living on frogs, crayfishes, and fishes, which it pursues in the water. It exhales a strong odor of musk, and its fur is in considerable request. The European and American minks are by some regarded as distinct species.

Minneapolis, county seat of Hennepin co., Minn., the metropolis of the state; on both sides of the Mississippi river at the Falls of St. Anthony, 420 m. n.w. of Chicago. The city limits join those of St. Paul (which see) on the east. Minneapolis is a great railway center. The principal lines are the Great Northern, C. B. & Q., C. & N. W., C. Gt. W., C. M. & St. P., C. St. P. & Minn., St. P. & Ste. St. Marie, the Northern Pacific, St. P. & D. and Wisconsin Central. The Falls of St. Anthony in the heart of the city furnish immense water power. Minneapolis is a great commercial center and the leading manufacturing city of the state. It ranks first in the manufacture of lumber and timber products and produces more flour than any other city in the world. The total value of manufactures for 1900 was $110,943,043. The city is renowned for its beauty of situation. The Falls of Minnehaha are within the city limits, and Lake Minnetonka is only a few miles away. Minneapolis is the seat of the University of Minnesota. Pop. 1900, 202,367.

Minnesota (min-e-so'ta), the *Gopher State*, is situated in the very center of the North American continent. On the n. it is bounded by Manitoba and Ontario, on the e. by Wisconsin, on the s. by Iowa, and on the w. by the Dakotas. The length from n. to s. is about 400 m.; the greatest width from e. to w. is about 354 m., and the total area is 84,287 sq. m. In 1900, the population was 1,751,394, of which 9,182 were Indians.

Surface.—Although Minnesota is one of the highest parts of the United States, the average altitude being about 1,275 ft. above sea level, the surface is in general an undulating plain diversified by few great elevations. In the

south and west are prairie lands, traversed by belts of timber. The great pine forests and the mines abound in the northeast. The lakes in Minnesota number about 10,000 and together with the numerous rivers afford an excellent system of drainage. Lake Superior has 150 m. of shore line on the n. e. boundary. The largest of the inland lakes are Red, Vermilion and Leech lakes, Mille Lacs and Lake Winnibigoshish. Three great river systems, the Mississippi, the St. Lawrence, and the Red River of the North have their remote sources in this state. The largest river is the Mississippi; there are five other navigable streams and many smaller rivers which furnish valuable water power.

Climate.—Because of its northerly position, Minnesota has a mean annual temperature of but 44°. In summer, the heat is often excessive in the daytime, but is considerably tempered by nightfall. The dryness of the atmosphere makes the winters far less severe in effect and more healthful than in damper regions. The average annual rainfall is about 25 in.

Mining.—Since 1901, Minnesota has led the states in the production of iron ore. The product in that year was 16,500,000 tons. The principal mines are in St. Louis and Lake counties, and Duluth is the center of the industry. Valuable granite quarries are found in the western part of the state, and limestone and sandstone exist in various localities.

Agriculture.—The staple agricultural product is wheat. The production in 1900 was 95,278,660 bushels, valued at $50,601,948, and placing Minnesota first in rank among the wheat producing states for that year. Potatoes are raised in large quantities and flax-growing yields a good income from new land. The cultivation of the sugar beet and corn, and fruit-growing and market gardening are rapidly increasing. Stock-raising and dairying are also growing industries.

Manufactures.—The falls and rapids in all parts of the state afford almost unlimited water power for manufacturing purposes. The manufacture of flour and grist mill products is the leading industry, and one in which the state far outranks all others. Minneapolis (which see) is the center of this industry and also of the manufacture of lumber and timber products, which ranks second in importance in the state. St. Paul is an important manufacturing center, as is also Duluth, which has large lumber mills.

Transportation.—Minnesota has 6,560 miles of railway. The most important lines radiate from St. Paul and Minneapolis (which see) and reach all parts of the state. The rivers afford over 2,500 miles of navigation and Lake Superior gives water communication eastward to the sea-board.

Education.—The state system of educational institutions includes the University of Minnesota, at Minneapolis; normal schools at Winona, Mankato, St. Cloud, Moorhead and Duluth; high schools maintained in part by the sum of $400 given annually to each by the state; and graded schools, each of which receives similarly $200. The general equipment of the last two classes of schools and the quality of instruction are steadily improving. The state also supports hospitals for the insane at St. Peter, Rochester, and Fergus Falls; an Institute for Defectives and schools for the deaf, dumb and blind at Fairbault; a Public School for Dependent and Neglected Children at Owatonna; a Training School for Boys and Girls in Goodhue County; a Reformatory at St. Cloud; a Soldiers' Home at Minnehaha Falls; and the State Prison at Stillwater.

History.—The greater portion of Minnesota was obtained by the United States through the Louisiana Purchase in 1803. The first settlement was a military post, Ft. Snelling, established in 1822; but immigration and occupation practically began only after the treaty with the Dakotas in 1837, by which all of the lands east of the Mississippi held by the Indians were ceded. In 1849, Minnesota became a territory and was admitted into the Union in 1858. The development of the state was retarded by Sioux depredations, which culminated in a great massacre in 1862, and also by the Civil War. When these conditions passed and a system of railways opened up the state, rapid growth was possible. Minnesota is one of the most resourceful and prosperous states. The principal cities with their popululion in 1900 are: St. Paul, the capital, 163,065; Minneapolis, 202,718; Duluth, 52,969; Winona, 19,714; Stillwater, 12,318; and Mankato, 10,599.

Minnesota River, a river in the U. S. which flows through Minnesota and falls into the Mississippi 5 mi. above St. Paul; length 470 mi.

Minnesota, UNIVERSITY OF, a State institution of learning at Minneapolis, established in the Minnesota Territory in 1851. Besides the usual academic and professional departments, the university has a School of Mines and School of Agriculture. In 1904 the faculty numbered 280 and the students 3,825; the library contained 113,000 volumes. The president is Cyrus Northrop.

Minorca, an island in the Mediterranean, belonging to Spain, the second largest of the Balearic group; area 260 sq. mi. Mount El Toro, in the center, attains the height of about 5,000 ft. The soil is not generally fertile, yet a considerable quantity of wheat, oil, wine, hemp, flax, oranges, etc., is produced. Iron, copper, lead, and marble are plentiful. Pop. 39,005.

Minor Prophets, THE, so called from the brevity of their writings, are twelve in number, viz., Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, and Malachi. Their prophecies are found in the Hebrew canon.

Min'otaur, in Greek mythology, a monster fabled to have had the body of a man with the head of a bull, and to have fed on human flesh, on which account Minos shut him up in the labyrinth of Dædalus, and at first exposed to him criminals, but afterward youths and maidens yearly sent from Athens as a tribute. He was slain by Theseus.

Minsk, a town of Russia, capital of government of same name, on the Svislotch, 420 mi. s.w. of St. Petersburg. It is the see of a Greek archbishop and of a Roman Catholic bishop, and contains two castles. It has some manufactures and a considerable general trade. Pop. 54,307. The government, which has an area of 35,290 sq. mi., has extensive forests and great stretches of marsh or swamp. Pop. 1,646,579.

Mint, the name given to several herbaceous aromatic plants. They are nearly all perennial, having square stems which bear opposite and simple leaves; they are widely distributed throughout temperate regions; and they abound in resinous dots which contain an essential oil. Mint has an agreeable odor, and partakes in the highest degree of tonic and stimulating properties.

Green Mint.

Mint, the place where a country's coinage is made and issued under special regulations and with public authority. In the U. S. there are mints at Philadelphia, San Francisco, Carson, New Orleans, and Denver.

Min'ute, a division of time and of angular measure. As a division of time it is the sixtieth part of an hour. As a division of angular measure it is the sixtieth part of a degree. In astronomical works minutes of time are denoted by the initial letter *m*, and minutes of a degree or of angular space, by an acute accent (′).

Mi'ocene (Gr. *meiōn*, less, *kainos*, recent), in geology, the name given by Sir Charles Lyell to a subdivision of the tertiary strata. The terms *Miocene* and *Pliocene* are comparative, the first meaning less recent and the other more recent. The Miocene strata contain fossil plants and shells which indicate a warm climate. The mammals are important, and foreshadow the animal life of the present day. No strata of Miocene Age occur in the British Isles.

Miösen (my*eu'*sen), the largest lake in Norway, about 40 mi n.e. of Christiania. It is 62 mi. long and about 9¼ mi. in greatest breadth, and its waters are carried by the Vormen to the Glommen.

Miquelon (mik-lōn), an island in the Atlantic Ocean, near the southern coast of Newfoundland, belonging to France. It has been in the possession of the French since 1763.

Mirabeau (mē-rȧ-bō), Gabriel Honoré Riquetti, Comte de (1749–1791), French statesman, b. at Bignon, near Nemours. At an early age he manifested extraordinary intelligence, but his youth was a stormy and licentious one. He lived for some time in Holland and England, returning to France in 1785. On the assembling of the states general Mirabeau, elected for Aix, soon became prominent. When the king required the *tiers état* to vote apart from the other two orders it was Mirabeau who counseled resistance, demanded the withdrawal of the troops, consolidated the National Assembly, and defied the king's orders. As a practical statesman Mirabeau desired action, and for this reason he attempted to form alliances with Lafayette, the Duke of Orleans, Necker, and finally with the queen. Whether he might ultimately have been able to guide the revolution into peaceful ways has always been a matter of conjecture to historians, but this possibility was prevented by his death.

Miracle (Latin, *miraculum*, a wonder, a prodigy; in the original Greek *sēmeion*, a sign, *teras*, a wonder or prodigy), a suspension of, or deviation from, the known laws of nature, brought about by the direct interference of a supreme supernatural Being. It is in its nature, as the term implies, an occurrence which is strange, marvelous, inexplicable, and is usually connected with some ulterior moral purpose. By the elder theologians a miracle was conceived to be the triumph of the Divine Will over the work of his hands and the laws of his making. In modern exegesis, however, the miraculous element is not considered to give evidence of opposing forces. On the contrary, a miracle is explained as a manifestation of the Divine Power working through laws and by methods unknown to us, and which, upon a higher plane, are altogether natural and orderly.

Miracle Plays, a sort of dramatic entertainments common in the Middle Ages, in which the subjects were taken from the lives of saints and the miracles they wrought. They were originally performed in church, but latterly outside, in market places and elsewhere. In England they were first produced in the twelfth century. They differed from the mysteries mainly in subject.

Mirage (mi-räzh′), an optical illusion, occasioned by the refraction of light through contiguous masses of air of different density; such refraction not infrequently producing the same sensible effect as direct reflection. It consists in an apparent elevation or approximation of coasts, mountains, ships, and other objects, accompanied by inverted images. In deserts where the surface is perfectly level a plain thus assumes the appearance of a lake, reflecting the shadows of objects within and around it. The mirage is commonly vertical, that is, presenting an appearance of one object over another, like a ship above its shadow in the water. Sometimes, however, the images are horizontal. *Looming* is a phenomenon of the same nature, in which the objects appear to be lifted above their true positions, so that an observer sees objects which are beyond the

horizon. The cause is in both cases the same, for while the mirage is produced in most instances by reflection from the desert sand, looming is occasioned by reflection from the sky. The phenomenon called Fata Morgana which is sometimes seen on the Calabrian coast is a kind of mirage. By it men and animals apparently of immense size may sometimes be seen presented in the air.

Miramichi (mi-ra-mi-shē'), a bay and river of New Brunswick, Canada. The bay is 20 mi. wide at its entrance and runs 21 mi. inland. The river falls into the bay after a n.e. course of about 90 mi., of which 40 are navigable for large vessels.

Mirror, a smooth surface capable of regularly reflecting a great proportion of the rays of light that fall upon it. The mirrors used by the ancients, and more especially by the Etruscans, were made of thin polished bronze, either set in a case or fitted with a handle. Small metal mirrors were also used by the Greeks and Romans. The making of glass mirrors, which had their backs silvered with an amalgam of mercury and tin, was early practised by the Venetians, and by strict prohibitive statutes they were long able to keep their workmen in Venice and enjoy a monopoly of the trade. The older method of silverizing mirrors by the amalgam of mercury and tin occupied usually a period of weeks, and it has been generally given up. In 1835 Liebig observed that by heating aldehyde in a glass vessel along with an ammoniacal solution of nitrate of silver, a coating of brilliant metallic silver was left upon the glass. This has now been made use of in mirror making by what are known as the hot and cold processes. In the hot process the glass is first sensitized with a solution of tin, which is then rinsed off and the plate laid upon a flat, double-bottomed metal table heated by steam to about 100° F. In this position a solution of nitrate of silver, ammonia, and tartaric acid in distilled water is poured over it; and if the temperature is kept uniform a thick deposit of silver will be formed in about half an hour. When the silver layer is carefully wiped this process is repeated. In the cold process a solution of nitrate of silver, nitrate of ammonium, and caustic soda dissolved in water, is mixed with a solution of loaf sugar, vinegar, and water. This is poured quickly and evenly over the glass plate, and the silver is precipitated in a few minutes, after which it is washed and the process repeated. The silvering is then protected by a coating of shellac or copal varnish. More recently a solution of bichloride of platinum is applied to the surface of the glass and precipitated with oil of lavender in the manufacture of the cheapest mirrors. Mirrors may be plane or spherical, and in the latter case they may be either convex or concave. See *Light.*

Misdemeanor, a term applied to all crimes and offenses, whether of omission or commission, less than felony. Misdemeanors are of two kinds—either those which exist at common law, *mala in se,* or those created by statute.

Missions and Missionaries.—Missionaries are men who devote their lives to the enlightenment and conversion of peoples who are in ignorance of God and the Christian religion. The first missionary was St. John the Baptist, who preached and instructed on the coming of Christ. He was followed by Jesus Christ himself, the great divine missionary who for three years preached in Jerusalem and the surrounding country. Before Christ's ascension into heaven he commissioned his apostles to preach the gospel to all nations. The apostles and their successors obeyed the divine command so implicitly that in the course of a few centuries Christianity spread over all parts of the Roman Empire. In some quarters it gave way before the Germanic invaders of the fifth and sixth centuries and some of the most noted missionaries were those who propagated their faith among the Germanic tribes. St. Augustine, who was sent by Gregory the Great with forty associates to preach the gospel among the Saxons of Britain at the end of the sixth century, was the first of this missionary group. Ireland, after her acceptance of the Christian faith, took her place at once as the most active of its propagandists, doing a remarkable work in Germany. Germany in turn sent out missionaries who converted Denmark, Sweden and Norway, Poland, Hungary and Bohemia. The Crusades opened up new spheres for missionary efforts in the East, and two religious orders founded at the beginning of the thirteenth century, the Dominicans and Franciscans, devoted themselves to preaching among the Mussulmans.

A new impulse was given to missions by the discovery of the New World. Almost every merchant ship that sailed for the West Indies, Mexico, Peru and Brazil, was accompanied by zealous missionaries eager to spread the Christian religion in the new lands. The powerful Order of the Jesuits which was founded in the sixteenth century turned their attention to the East, and the celebrated Francis Xavier, a member of the Order, proceeded to India, where his efforts were crowned with phenomenal success. From India Christianity was introduced into Japan, where it had to contend against terrible persecutions, before which the missionaries were at length compelled to retire. Father Ricci, another Jesuit, penetrated to Pekin and succeeded about the end of the sixteenth century in making a firm foothold.

In 1622, Gregory XV gave a better organization to the Roman Catholic missions by the foundation of the Congregation *de Propaganda Fide.* Since 1822 the work of the propagation of the faith has been administered from Lyons, France. In fifty years it has distributed over $20,000,000 for Catholic foreign missions. The principal national missionary enterprises are carried on from France. The Seminary for Foreign Missions at Paris has, since 1840, sent out nearly 2,000 priests; at present about 1,200 French missionaries carry on its work, aided by about 600 native priests. It has missions throughout China, Korea, Thibet, Turkey, Siam and Hindustan. There

are moreover about 10,000 French sisters in the foreign fields. The Italian Catholic missionaries devote most of their attention to the Orient. A notable event in the history of Oriental missions was the establishment by Leo XIII of a regular hierarchy in India (1886) and in Japan (1891). The Catholics of the United States have since 1884 helped materially in supporting the missions for Indians and negroes, aside from contributing generously to the foreign fund. The most active single missionary body is the Society of Jesus, which now has in the field over 3,000 missionaries. It is estimated that the whole army of Catholic workers now reaches 60,000, and that there is scarcely a part of the world remaining unvisited by them.

The earliest Protestant foreign mission appears to have been one which was established by the French in Brazil in 1555. Next, Gustavus Vasa, King of Sweden, in 1559 sent forth missionaries to convert the Laplanders. Shortly after the settlement of New England in 1620, John Eliot took a deep interest in the North American Indians and in 1646 began a regular mission among that people. But it was not until the eighteenth century that the true missionary spirit awoke. The English took the lead in this movement and were speedily followed by the Danes and Germans, especially the Moravian brethren. In 1701 there was formed in connection with the Church of England an association for missionary purposes called the Society for the Propagation of the Gospel in Foreign Parts. John Wesley labored from 1735 to 1737 as a missionary of this body in Georgia. The first mission of the Wesleyan Methodists was sent out in 1786 to the West Indies. The Baptist Missionary Society was founded in 1792 in consequence of the exhortations of William Carey, who himself went as a missionary to India. Carey's greatest work was that of Bible translation; under his direction the Bible was translated into thirty-four dialects and scattered broadcast amongst the natives. The reading of Carey's first letters led in 1795 to the formation of the London Missionary Society, in which several denominations united. In 1797 there was organized in Holland the Netherlands Missionary Society, from which a score of other societies have sprung. The missionary enthusiasm in Europe during the closing years of the eighteenth century spread to America and led Samuel J. Mills and several other students at Williams College to pledge their services to foreign missions. The earnestness of these young men brought about the formation in 1811 of the American Board of Commissioners for Foreign Missions, an interdenominational society. The success of Adoniram Judson and the other early missionaries sent out by this society was the beginning of the great American work in foreign fields which has had such a rapid growth during that century. All the large denominations and many of the smaller ones now have their societies which contribute workers and money annually. The total number of Protestant societies engaged in missionary enterprises is over 550. These societies are represented in the field by about 15,000 missionaries and 77,000 native helpers.

In modern Christian nations the establishment of schools and the diffusion of religious literature have been important factors. The work of medical missionaries has also helped to clear the way for Christian teaching, but the element which has proved most potent in attracting the heathen to the Christian religion is the example of consistent Christian living set by the missionaries.

Mississip'pi ("Great Water"), the principal river of North America, and one of the largest rivers in the world. It has its source in Lake Itasca, state of Minnesota, whence it issues about 12 ft. wide and 2 ft. deep; from thence it trends southward through a number of lakes and over a series of rapids until the Falls of St. Anthony are reached; below this it receives the Iowa, the Illinois, and the Missouri as tributaries, but the latter is really the main stream, having a length of 2,908 mi. before the rivers unite, while that of the Mississippi is only 1,330 mi. From St. Louis, a little below their confluence, the Mississippi becomes a broad, rapid, muddy river, liable to overflow its banks; lower down it receives in succession the Ohio, Arkansas, and Red rivers, and it finally enters the Gulf of Mexico through a large delta with several "passes," some distance below New Orleans. The combined lengths of the Missouri and Mississippi are about 4,200 mi.; the whole area drained by the Mississippi is 1,246,000 sq. mi.; the maximum flood volume reaches 1,400,000 cu. ft. per second below the Ohio; and the sediment transported to the gulf annually would make a block 1 mi square and 260 ft. high. Above its junction with the Ohio at Cairo the river enters upon a large alluvial basin, bounded on both sides by high bluffs, and through this plain the river winds for about 1,150 mi. The volume is usually smallest in October and greatest in April, and the low-lying lands are subject to terrible floodings during the spring freshets. At many places attempts have been made to secure the river within its banks and save the country from loss and suffering by building dykes, or *levees* as they are called. The sediment carried down, however, is continually raising the bed of the river, and thus breaks are frequently made in these levees. A recent method of improving the river's course, sanctioned by Congress and superintended by Captain Eads, is to construct light willow screens or dams on the shoals and at the wide places on the river where bars already exist. By this a deposit is formed which in time will act as a bank to hem in the river, while the increased volume thus obtained will help to scour out a deeper channel. The most important towns on the river banks are St. Paul, St. Louis, Cairo, Memphis, Vicksburg, Natchez, and New Orleans.

Mississippi (mis-is-ip'i) the *Bayou State*, one of the Gulf states of the Union; is bounded on the n. by Tennessee, on the e. by Alabama, on the s. by Louisiana and the Gulf of Mexico,

and on the w. by Louisiana and the Mississippi river, which separates it from Arkansas and a part of Louisiana. It has an average length from n. to s. of 335 m., width from e. to w., 150 m., gross area, 46,810 sq. m. The population in 1900 was 1,551,270, of which 910,070 were colored.

Surface.—The surface is hilly, except in the Mississippi bottom lands. These lands lying between the Mississippi and Yazoo rivers are protected by levees. The highest hills are only 800 feet above the sea level. The northwestern part of the state is almost entirely level prairie. Mississippi has several large rivers; the Yazoo, 264 miles long, flowing into the Mississippi; the Pearl and the Tombigbee, flowing into the Gulf of Mexico. The coast line of the state is only 100 m. and is separated from the Gulf by the Mississippi Sound and a chain of small islands. There are several fine mineral springs.

Climate.—The winters are mild with a mean temperature of 45°; the mean summer temperature is 81°. Gulf breezes render the climate delightful most of the year. The average annual rainfall is about 53 in.

Mining.—Mining deposits are not of importance. Isolated beds of lignite and several kinds of clay are found, also building-stones and glass materials.

Agriculture.—The most fertile land is in the Yazoo delta, which is renowned as the best cotton land in the world. The state stands third in the Union in the production of cotton, which in 1900 was 1,203,739 bales. The land throughout the state is capable of producing every variety of farm crops. Corn, oats, rice and potatoes are raised in abundance. In the southern counties figs, oranges, olives and other semi-tropical fruits flourish. In the central and northern parts grapes, apples, peaches, pears, plums and apricots are raised. Thousands of acres are devoted to the cultivation of strawberries and tomatoes for the early northern markets. In the n. e. forage crops flourish and stock-raising is an important industry. The forests are still extensive, covering three-fifths of the land, the most valuable tree being the yellow pine.

Manufactures.—Although Mississippi is an agricultural state, the manufacturing industries have grown rapidly since 1880. Inadequacy of transportation facilities and lack of water-power and good harbors have handicapped the industries. The most important is now the manufacture of lumber and timber products. Other industries are the manufacture of cottonseed oil and cake, cotton ginning, manufacture of turpentine and resin and planing mill products.

Transportation.—The growth of the railway system during recent years has been rapid. The state has now a mileage of nearly 3,000. Railroads: Illinois Central, Yazoo & Mississippi Valley, Memphis & Vicksburg and N. O. M. & T. Mississippi has about 100 miles of Gulf coast; at Ship Island is the most important harbor. On the western border, the Mississippi river affords fine facilities for shipping.

Education.—Mississippi ranks first among the Southern states and eighth in the United States in the amount expended for education in proportion to the valuation of property. Separate schools are maintained for the colored race. Since the Civil War, a fresh interest in schools has been awakened, and in 1886 a system of free schools was established. The higher institutions of learning supported by the state are the University of Mississippi at Oxford, founded in 1848; the Agricultural and Mechanical College at Starkville; and the Mississippi State Normal at Holly Springs. Denominational colleges are Mississippi College at Clinton, Rust University (colored) at Holly Springs and Millsaps College at Jackson.

History.—The first European to pass through the region of the Mississippi was the Spaniard, De Soto, but he left no settlements. In 1541 he discovered the Mississippi river. La Salle took possession of the country in the name of France in 1682, calling it Louisiana. The first colony was established at Biloxi, 1699, by d'Iberville. The territory was ceded to Great Britain in 1763. The colony flourished until 1780, when it was subjugated by the Spanish governor of Louisiana. By the Treaty of 1783, the independence of the United States was recognized. In 1798, the Territory of Mississippi was organized; in 1817, Mississippi was admitted as a state. Jackson, the capital, named in honor of Gen. Andrew Jackson, was founded in 1821. In 1832, a new constitution was adopted. Except for the financial panic in 1837, the state was prosperous until the Civil War. Negro slaves, first imported in 1720, were an important factor in the state economy. The ordinance of secession was adopted Jan. 9, 1861, and one month later Col. Jefferson Davis, who had won great honor in the Mexican War, was elected president of the Southern Confederacy. In or on the borders of Mississippi were fought the battles of Shiloh, Iuka, Corinth, Chickasaw, Bayou, Port Gibson, Champion Hills, Vicksburg and Harrisburg, and much of her best territory was devastated by Union armies. In November, 1869, the constitution of 1868 was ratified. In 1890, a new constitution was adopted. The principal cities of Mississippi with population in 1900, are: Jackson, the capital, 7,816; Vicksburg, 14,834; Meridian, 14,050; and Natchez, 12, 210.

Mississippi Scheme, a bubble scheme projected by John Law at Paris in 1717. Part of the scheme was for the colonization and development of the Mississippi Valley, but combined with this there was a banking scheme and a scheme for the management of the national debt, the whole being supported by the French government. Such were the hopes raised by this undertaking that the shares originally issued at $100 were sold at ten, twenty, thirty, and even forty times their value. People came from all parts of France, and even from foreign countries, in order to invest in the company, and there was a general mania of speculation. The state took advantage of the popular frenzy to issue increased

quantities of paper money, which was readily accepted by the public creditors of Law's company. The value of the paper money became depreciated and the shares fell in price. Law, the originator of the bankrupt company, fled from France in 1720 and the state acknowledged itself debtor to the shareholders.

Missouri (mis-oo'ri), the *Bullion State*, a West Central state, is bounded on the n. by Iowa, on the e. by Illinois and Kentucky, on the s.e. by Tennessee, on the s. by Arkansas, and on the w. by Indian Territory, Kansas and Nebraska. Its extreme length from e. to w. is 318 m., average breadth from n. to s. 244 m., and the gross area, 69,415 sq. m. The population in 1900 was 3,106,665, of which 161,822 were colored.

Surface.—The Missouri river divides the state into two unequal sections. That part of the state lying north of the river is mostly rolling prairie with a luxuriant growth of timber along the streams. The portion south of the Missouri river has a more diversified surface, the southeastern part being low and swampy, and the strip of land along the Mississippi north of the swamps to the mouth of the Missouri consisting of highland bluffs. In the southwest are the Ozark mountains, which render the whole region broken and hilly. Some peaks rise to 1,600 feet above the sea level. The principal rivers are the Mississippi, which bounds the state on the east; the Missouri, forming the western boundary for nearly 200 miles, then flowing east across the state into the Mississippi, 20 miles north of St. Louis; the Osage, Gasconade, Grand and numerous other rivers flowing north and east into the Missouri; the Little river, Meramec, Fabius and Salt rivers, flowing east into the Mississippi. The general drainage is indicated by long, gentle slopes toward the Missouri and the Mississippi.

Climate.—The climate is generally healthful, except in the bottom lands and the extreme southeast. The winters are severe, with sharp winds; the summers, long and hot. The mean annual temperature is 45°; the average rainfall, 41 in.

Mining.—The mineral resources of Missouri are varied and rich, comprising extensive coal fields, vast deposits of iron ore, lead and zinc; while nickel, copper, cobalt, fire-clays, fine marbles, granite, sandstone, slate, limestone, gypsum, feldspar, carbonate of lime, mica and asbestos are also abundant. Petroleum is produced in Bates county. The output of coal for 1901 was 3,813,527 tons. Many new mines have been opened in 1901-1903, and up-to-date appliances have been put into most of the old mines. The coal fields are capable of yielding 100,000 tons of bituminous coal per day for several thousand years. The lead ore production for 1900, 109,376 tons, selling at $4,865,518, showed an increase both in production and value. The zinc product, 1901, was 224,073 tons and netted $5,308,671. The output of iron ore was 140,280 tons, an increase of 51,160 tons over the preceding year. During recent years gold and silver have been found in small quantities. The output in 1900 amounted to $100 worth of gold and $129 of silver.

Agriculture.—Agriculture is the leading industry of the state. The chief products are corn, wheat, oats, hay, buckwheat, potatoes, tobacco and cotton. Missouri ranks fifth in the Union in raising of live stock. In the northern part of the state are many large and profitable dairies and poultry farms. Only about one-third the area of the state is cultivated and much of the uncultivated portion is heavily timbered. Missouri is, in general, a good fruit country. In the southwest, peaches, pears, apples, nectarines and grapes are cultivated. Blackberries and strawberries abound, both wild and cultivated. Missouri is the leading state in the production of apples.

Manufactures.—The aggregate value of manufactures for 1900 was $176,657,632, an increase of $20,866,871 over the previous year. Slaughtering and meat-packing is the most important industry. The chief centers of this industry are St. Joseph and St. Louis. The manufacture of tobacco ranks second. Other industries are flour mills, foundries, machine shops, printing and publishing, the manufacture of shoes, of clothing, of lumber and timber products, of cotton goods and of cars. The wines of Missouri are second only to those of California. Much honey and beeswax are produced.

Transportation.—Railroads: A. T. & S. F., C. R. I. & P., C. B. & Q., K. C. Ft. S. & M., M. K. & T., Missouri Pacific, St. Louis & Southwestern and the Wabash. The state has a mileage of nearly 7,000. The Mississippi and Missouri rivers are spanned by several iron bridges. Missouri has three interior ports to which foreign merchandise can be transported without appraisement at receiving ports, Kansas City, St. Joseph and St. Louis. The aggregate value of foreign merchandise imported to these ports in 1900, was $4,480,283. Interurban electric railways connect Kansas City, St. Louis and Carthage with neighboring cities.

Education.—The school system of Missouri ranks high. Any city, town or village may constitute a school district. There are good high schools for both colored and white pupils in all the larger towns and cities. The percentage of illiteracy among the colored population is rapidly decreasing. Manual training is given in the high schools of Carthage, Kansas City, Moberly, St. Louis and Sedalia. There are state normal schools at Cape Girardeau, Kirksville, St. Louis and Warrensburg. Normal schools for the colored race are at Hannibal, Jefferson City, Kansas City and Sedalia. Among institutions of higher learning are the University of Missouri at Columbia, Washington University at St. Louis, William Jewell College at Liberty, St. Louis University at St. Louis, Christian University at Canton and Park College at Parkville. There are many excellent libraries in the state both public and those in connection with colleges and universities. There are numerous schools of medicine, mostly at St. Louis. The state school for the

blind is at St. Louis, the school for the deaf and dumb at Fulton and the hospital for the insane at Farmington.

History.—Missouri was explored in 1541 by Hernando De Soto, the Spanish adventurer. He passed through the region now known as New Madrid county, moved west, crossed the Ozark Mts., then journeyed south into Arkansas. In 1673, Marquette discovered the upper Mississippi. In 1682, La Salle explored the Mississippi and took possession of the country in the name of Louis XIV. The territory included Missouri. In 1705, a party of Frenchmen ascended the Missouri river. In 1719, the French began to explore the interior. The first permanent settlement was made at Ste. Genevieve, about 1735. The next settlement of any consequence was St. Louis, founded by Pierre Laclede in 1764. By the treaty of 1763, Missouri was transferred to Spain, and from Spain to France in 1800, and formed part of the territory of Louisiana organized in 1803. In 1812, this part of the territory took the name of Missouri. In 1821, Missouri was admitted to the Union. During the Civil War, Missouri suffered greatly. According to the *Missouri Compromise* of 1820, it was agreed that slavery should be excluded from all that part of Louisiana north of latitude 36° 30′, except Missouri. This law was repealed in 1854. The people of Missouri were almost equally divided in sentiment and provided troops for both sides during the Civil War. Almost immediately after the close of the war, the state entered upon an era of wonderful prosperity, which is now greater than in any previous year of its history. A World's Fair is being planned to take place at Forest Park in St. Louis in 1904, celebrating the centennial of the Louisiana Purchase. The principal cities with population in 1900 are: Jefferson City, the capital, 9,664; St. Louis, the fourth largest city in the United States, 575,238; Kansas City, 163,752; St. Joseph, 102,979; and Joplin, 26,023.

Missouri, UNIVERSITY OF, a State institution of higher learning founded in Columbia, Mo., in 1839. It comprises a college of liberal arts, a graduate school and departments of education, law, medicine, military science and tactics, agricultural and mechanical arts and a school of mines and metallurgy. In 1904 it had a faculty of 120, 1,591 students and a library of over 60,000 volumes. The president is Richard H. Jesse.

Missouri Compromise, an act of Congress, passed in 1820, by which Missouri was admitted into the Union as a slave-holding state, but which enacted that slavery should never be established in any future formed state north of the northern line of Tennessee.

Mistletoe, a parasitic evergreen plant of Europe and the United States. When found upon the oak, where it is rare, it was an object of superstitious regard among the Druids. It is common on certain species of trees, such as the apple and pear trees, the hawthorn, maple and lime.

Mistral, a violent, cold northwest wind experienced in Provence and other neighboring districts bordering on the Mediterranean, and destroying crops, fruit, blossom, etc. It blows with greatest violence in autumn, winter, and early spring.

Mitchel, JOHN (1815–1875), Irish Nationalist, b. in county Derry. He was one of the leaders of the Young Ireland party, was banished to Australia in 1848, escaped in 1853, and became a journalist in America. In 1874 he was returned as member of Parliament for Tipperary, but, being disqualified, never took his seat.

Mitchel, ORMSBY M. (1809–1862), astronomer, b. in Morganfield, Ky. He was professor of astronomy in Cincinnati College from 1836 to 1844, building its large observatory. His observations of stars, nebulæ, etc., have been numerous. In the Civil War he attained the rank of major general of volunteers.

Mitchell, DONALD GRANT, author, b. in Norwich, Conn., 1822. *Reveries of a Bachelor*, perhaps his most popular book, appeared in 1850. Besides other works he has contributed to magazines, and given lectures on literature and agriculture.

Mitford, WILLIAM (1744–1827), English historian. He wrote a history of Greece. The first volume appeared in 1784; the fifth and last, bringing the narrative down to the death of Alexander the Great, was published in 1818. For some time his history was considered the standard. He held the professorship of ancient history in the Royal Academy, and sat in Parliament from 1785 till 1818.

Mithrida'tes (or Mithrada'tes) (138–63 B.C.), king of Pontus, on the southern shore of the Black Sea; surnamed the *Great*. Mithridates ascended the throne at the age of thirteen. Soon after attaining his majority he commenced his career of conquest, which made him master of nearly all Asia Minor, besides Greece, and brought him into conflict with Rome. For four years Mithridates disputed possession of Asia, but was at last compelled to succumb, B.C. 84. After the death of Sulla, which occurred in B.C. 78, Mithridates levied another army with a determination to expel the Romans from Asia. Being defeated by Lucullus, who was appointed consul B.C. 74, he was followed by the victorious Romans into his own states, and driven to seek a refuge in Armenia. Here Mithridates raised a third great army, and in B.C. 67 completely defeated the Romans; and, following up his success, rapidly recovered the larger part of his dominions. The Romans now invested Pompey with absolute power in the East, and by him, in B.C. 66, the forces of Mithridates were completely routed near the Euphrates. The king retired to Bosporus (the Crimea), where his troops, headed by his son Pharnaces, broke out in mutiny, and Mithridates killed himself.

Mitla, a ruined city of Mexico, 15 mi. s.e. of Oajaca, with extensive remains of a prehistoric race.

Mittau (mit'ou) (or Mitau), a town in Russia, capital of the government of Courland, in a

low, flat, and sandy district on the Aa, 25 mi. s.w. of Riga. Pop. 26,600.

Moabite Stone, a monument of black basaltic granite about 3 ft. 5 in. high and 1 ft. 9 in. wide and thick, with rounded top but square base, on which there is an inscription of thirty-four lines in Hebrew-Phœnician characters, discovered in 1868 at Dhiban, in the ancient Moab. It was unfortunately broken by the natives, but almost the whole of the inscription has been recovered from the broken pieces. The inscription dates about 900 B.C., and is the oldest known in the Hebrew-Phœnician form of writing. It was erected by Mesha, king of Moab, and is a record of his wars with Omri, king of Israel, and his successors.

Moberly, Randolph co., Mo., 23 mi. s. of Mason City. Railroads: M. K. & T.; and Wabash. Industries: railroad machine shops, car shops, and factories. Coal is mined in the vicinity. Shipments include farm produce, live stock, wool, hides, hard wood, lumber, etc. Pop. 1900, 8,012;

Mobile, county seat of Mobile co., Ala., on the Mobile river, near its entrance into Mobile Bay; and on the Southern, the L. & N., and the Mobile & Ohio railroads. It is the only port of entry in the state, and has an extensive export trade, particularly in cotton and naval stores, lumber, rosin, turpentine, iron, coal, machinery and western foodstuffs. Its chief imports are tropical fruits, sisal grass and coffee. The principal industry is the manufacture of lumber. Other industries in the order of their importance are masonry, foundries and machine shops, ship and boat building and printing and publishing. In the vicinity, market gardening is extensively carried on. Mobile was founded in 1702. It was the capital of the Louisiana Territory till 1720, captured by the Spanish in 1780 and occupied by the U. S. troops in 1813. It is the seat of a Jesuit college, a Roman Catholic academy, Barton Academy and Alabama Medical College. It has a U. S. Marine Hospital, the Providence Infirmary, a U. S. government building, a court-house, and a good public library. Mobile is the largest city in the state. Pop. 1900, 38,469.

Mobile, a river in Alabama, formed by the union of the Alabama and the Tombigbee, which unite about 45 mi. above the town of Mobile. It enters Mobile Bay by two mouths.

Mobile Bay, an estuary of the Gulf of Mexico from 8 to 18 mi. wide, and about 35 mi. in length, n. to s., the general depth being 12 to 14 ft.

Moc'casin Snake, a very venomous serpent, frequenting swamps in many of the warmer parts of America. It is about 2 ft. in length, dark brown above and gray below.

Mocha (or Mokha) (mok'a), an Arabian fortified seaport, on the Red Sea, about 40 mi. within the Strait of Báb-el-Mandeb, the chief port and emporium in the dominions of the Imám of Sana. It owes its importance to the coffee trade. Pop. 5,000.

Mocking Bird, an American bird of the thrush family. It is of an ashy brown color above, lighter below, and is much sought for on account of its wonderful faculty of imitating the cries or notes of almost every species of animal, as well as many noises that are produced artificially. Its own notes form a beautiful and varied strain. It inhabits North America chiefly, being a constant resident of the Southern states, and but rare and migratory in the northern parts of the continent. It is also found in the West India Islands and in Brazil.

Mod'ena, a town of North Italy, capital of the province of its own name, situated in a somewhat low but fertile plain, between the Secchia and the Panaro. The most remarkable edifices and establishments are the cathedral; a fine campanile; several fine churches: the ducal, now the royal palace, a splendid structure; the university; the public library, of 100,000 volumes, etc. The manufactures and trade are unimportant. Pop. 31,053. Modena was formerly an independent duchy but is now divided into the provinces of Modena (966 sq. mi.; pop. 289,247), Massa-Carrara, and Reggio.

Moderator Lamp, a lamp for burning oil, especially vegetable oil, in which the oil is forced through a tube up toward the wick by a piston pressing on its surface, to which a downward impulse is communicated by means of a spiral spring situated between it and the top of the barrel or body of the lamp. The passage of the oil up the tube is so regulated, or *moderated*, by an ingenious internal arrangement of the tube, that its flow is uniform.

Mod'ica, a town of Sicily, in the province of and 31 mi. w.s.w. of Syracuse. It exports grain, oil, wine, cheese, etc. Pop. 38,390.

Modjeska, HELENA (1844——), a Polish actress; b. at Cracow, Austria, Oct. 12, 1844. When 17 she married Modrzejewska, a government official of Cracow. When she went on the stage in the United States she abbreviated the name to Modjeska. Her first appearance on the stage was in her native city in 1862, and her success was immediate. After the death of her first husband she married, in 1868, Charles Bozenta Chalpowski. In 1876 she settled in California, but returned to the stage the next year, making her first appearance in San Francisco. Modjeska has made several tours through the United States and England with great success. Her favorite rôles are Imogen, Beatrice, Juliet, Rosalind, Camille, Mary Stuart and Cleopatra. Pl. 26, Vol. III.

Modocs, an American Indian tribe originally settled on the south shore of Klamath Lake, California. From 1847 till 1873 they were in continual conflict with the whites. Only a small remnant of them now exists in the Indian Territory and in Oregon.

Möen (*meu'* en), an island belonging to Denmark, on the s.e. of Zealand; area about 80 sq. m. Pop. 13,500.

Moffat, ROBERT (1795–1883), Scottish missionary traveler. He began missionary work in South Africa in 1813, and in 1818 made a long exploratory tour in the Damara country During a visit to Britain in 1842 he published

an account of his travels, and a translation of the New Testament and Psalms in the Bechuana language. He received the degree of D.D. from Edinburgh University, and in 1873 he was presented with a public testimonial of $29,000. One of his daughters became the wife of Doctor Livingstone.

Mogul', a word which is the same as *Mongol*, but is applied particularly to the sovereigns of Mongolian origin, called Great or Grand Moguls, descendants of Tamerlane, who ruled in India from the sixteenth century downward, the first of them being the conqueror Baber.

Mohammed (Mahom'et, or more correctly Muhammad) (A.D. 571–632), the founder of Islamism, was an Arabian by birth, of the tribe of the Koreish, and was b. of poor parents in Mecca. His parents d. early, and he was brought up by his uncle, Abu Talib, who trained him to commerce, and with whom he journeyed through Arabia and Syria. In his twenty-fifth year his uncle recommended him as agent to a rich widow named Chadidja, and he acquitted himself so much to her satisfaction that she married him, and thus placed him in easy circumstances. She was fifteen years older than he, but he lived with her in happy and faithful wedlock. He seems to have had from his youth a propensity to religious contemplation, for he was every year accustomed, in the month Ramadhan, to retire to a cave in Mount Hara, near Mecca, and dwell there in solitude. Mohammed began his mission in the fortieth year of his age by announcing his apostleship to his own family. His wife was one of the first to believe in him, and among other members of his family who acknowledged his mission was his cousin Ali, the son of Abu Talib. Of great importance was the accession of Abu Bekr, a man of estimable character, who stood in high respect, and persuaded ten of the most considerable citizens of Mecca to join the believers in the new apostle. They were all instructed by Mohammed in the doctrines of *Islam*, as the new religion was styled, which were promulgated as the gradual revelations of the divine will, through the angel Gabriel, and were collected in the *Koran*. After three years Mohammed made a more public announcement of his doctrine, but his followers were few for years. In 621 Mohammed lost his wife, and the death of Abu Talib took place about the same time. Deprived of their assistance he was compelled to retire, for a time, to the city of Tajf. On the other hand, he was readily received by the pilgrims who visited the Kaaba, and gained numerous adherents among the families in the neighborhood. Mohammed now adopted the resolution of encountering his enemies with force. Only the more exasperated at this, they formed a conspiracy to murder him; warned of the imminent danger, he left Mecca, accompanied by Abu Bekr alone, and concealed himself in a cave not far distant. Here he spent three days undiscovered, after which he arrived safely at Medina, but not without danger (A.D. 622). This event, from which the Mohammedans commence their era, is known under the name of the Hejira, which signifies *flight*. In Medina Mohammed met with the most honorable reception; thither he was followed by many of his adherents. He now assumed the sacerdotal and regal dignity, married Ayesha, daughter of Abu Bekr, and as the number of the faithful continued to increase, declared his resolution to propagate his doctrines with the sword. In the battle of Bedr (623), the first of the long series of battles by which Islamism was established over a large portion of the earth, he defeated Abu Sofian, the chief of the Koreishites. He in turn was defeated by them at Ohod, near Medina, soon after, and in 625 they unsuccessfully besieged Medina, and a truce of ten years was agreed on. Wars with the Jewish tribes followed; many Arabian tribes submitted themselves, and in 630 he took possession of Mecca as prince and prophet. The idols of the Kaaba were demolished, but the sacred touch of the prophet made the black stone again the object of the deepest veneration, and the magnet that attracts hosts of pilgrims to the holy city of Mecca. The whole of Arabia was soon after conquered, and a summons to embrace the new revelation of the divine law was sent to the Emperor Heraclius at Constantinople, the king of Persia, and the king of Abyssinia. Preparations for the conquest of Syria and for war with the Roman empire were begun, when Mohammed d. at Medina. His body was buried in the house of Ayesha, where he d., and which afterward became part of the adjoining mosque, and a place of pilgrimage for the faithful in all time to come. Of all his wives, the first alone bore him children, of whom only his daughter Fatima, wife of Ali, survived him. There is no doubt that Mohammed was a man of extraordinary insight and deep reflection. Though without book learning, he had a deep knowledge of man, was familiar with Bible narratives and Eastern legends, and possessed a grasp of the eternal ground of all religion, though tinged and modified by his vivid, poetic imagination.

Mohammed, the name of four Ottoman sultans.

Mohammedanism, the name commonly given in Christian countries to the creed established by Mohammed. His followers call their creed *Islam* (entire submission to the decrees of God), and their common formula of faith is, "There is no god but Allah, and Mohammed is his prophet." The dogmatic or theoretical part of Mohammedanism embraces the following points: 1, Belief in God, who is without beginning or end, the sole Creator and Lord of the universe, having absolute power, knowledge, glory, and perfection. 2, Belief in his angels, who are impeccable beings, created of light. 3, Belief in good and evil Jinn (genii), who are created of smokeless fire, and are subject to death. 4, Belief in the Holy Scriptures, which are his uncreated word revealed to the prophets. Of these there now exist, but in a greatly corrupted form, the *Pentateuch*, the

Psalms, and the *Gospels;* and in an uncorrupted and incorruptible state the *Koran*, which abrogates and surpasses all preceding revelations. 5, Belief in God's prophets and apostles, the most distinguished of whom are Adam, Noah, Abraham, Moses, Jesus, and Mohammed. Mohammed is the greatest of them all, the last of the prophets and the most excellent of the creatures of God. 6, Belief in a general resurrection and final judgment, and in future rewards and punishments, chiefly of a physical nature. 7, The belief, even to the extent of fatalism, of God's absolute foreknowledge and predestination of all events both good and evil.

The practical part of Mohammedanism inculcates certain observances or duties, of which four are most important. The first is prayer, including preparatory purifications. Prayer must be engaged in at five stated periods each day. On each of these occasions the Moslem has to offer up certain prayers held to be ordained by God, and others ordained by his prophet. During prayer it is necessary that the face of the worshiper be turned toward the kebla, that is, in the direction of Mecca. Prayers may be said in any clean place, but on Friday they must be said in the mosque. Second in importance to prayer stands the duty of giving alms. Next comes the duty of fasting. The Moslem must abstain from eating and drinking, and from every indulgence of the senses, every day during the month of Ramadham, from the first appearance of daybreak until sunset, unless physically incapacitated. The fourth paramount religious duty of the Moslem is the performance at least once in his life, if possible, of the pilgrimage (el-Hadj) to Mecca, after which he becomes a Hadji. Circumcision is general among Mohammedans, but is not absolutely obligatory. The distinctions of clean and unclean meats are nearly the same as in the Mosaic code. Wine and all intoxicating liquors are strictly forbidden. Music, games of chance, and usury are condemned. Images and pictures of living creatures are contrary to law. Charity, probity in all transactions, veracity (except in a few cases), and modesty, are indispensable virtues. After Mohammed's death Abu Bekr, his father-in-law, became his successor, but disputes immediately arose, a party holding that Ali, the son-in-law of Mohammed, was by right entitled to be his immediate successor. This led to the division of the Mohammedans into the two sects known as Shiites and Sunnites. The former, the believers in the right of Ali to be considered the first successor, constitute at present the majority of the Mussulmans of Persia and India; the latter, considered as the orthodox Mohammedans, are dominant in the Ottoman Empire, Arabia, Turkestan, and Africa. The total Mohammedan population of the world is estimated at fully 215,000,000.

Mo'hawk, a river of the U. S., the principal tributary of the Hudson in the state of New York; length about 135 mi. It affords abundant water power, and flows through beautiful scenery.

Mo'hawks, a tribe of North American Indians, belonging to the confederacy of the Five (afterward Six) Nations. They originally inhabited the valley of the Mohawk River. With the rest of the confederacy they adhered to the British interest during the War of the Revolution, and left the country on its termination for Canada, where lands were assigned them on the Grand River. Their language has been committed to writing.

Mo'hicans (or Mohegans), a tribe of Indians formerly occupying the country now forming the southwestern parts of New England and that portion of New York state east of the Hudson.

Mo'hilev, a town in Russia, capital of a government of the same name, on both banks of the Dnieper, 212 mi. w.s.w. of Moscow. The staple manufacture is tobacco, and the trade with Riga, Memel, Dantzig, and Odessa, chiefly in leather, wax, honey, potash, oil, and grain, is very extensive. Pop. 40,536. The government has an area of about 18,545 sq. mi.; pop. 1,234,211. There is another Mohilev in the government of Podolsk, on the left bank of the Dniester 60 mi. e.s.e. of Kamenetz, with a pop. of 18,129.

Moiré (mwȧ-rā), the French name given to silks figured by the process called watering. The silks for this purpose, though made in the same way as ordinary silks, are of double width, and must be of a stout, substantial make. They are folded and subjected to an enormous pressure, of from 60 to 100 tons, generally in a hydraulic machine, and the air in trying to escape drives before it the small quantity of moisture that is used, and hence is effected the permanent marking called watering, which is for the most part in curious waved lines. The finest kinds of watered silks are known as *moires antiques.* Woolen fabrics to which the same process has been applied are called *moreen.*

Mokanna, Al, Haken Ibu Hashem, styled the *Veiled Prophet*, a Mohammedan impostor of Persia in the eighth century. He attributed to himself divine powers, and gained many followers, so that at last the caliph was compelled to send an armed force against him. He retired to a fortress in Transoxiana, where he first poisoned and burned his family, and then burned himself. His followers continued to pay him honors after his death. He is the hero of Moore's *Veiled Prophet of Khorassan.*

Mold, a minute fungoid or other vegetable growth of a low type, especially one of such vegetable organisms as appear on articles of food when left neglected, on decaying matters, bodies which lie long in warm and damp air, animal and vegetable tissues, etc.

Moldau, the chief river of Bohemia, which, after passing through Prague, joins the Elbe; length 260 mi.

Moldings, in architecture, a general term applied to the varieties of outline or contour given to the surfaces or edges of various subordinate parts or features of buildings, whether projections or cavities, such as cornices, bases, door or window jambs, lintels, etc.

Mole, a name given to insectivorous animals, which, in search of worms or insect larvæ, form burrows just under the surface of the ground, throwing up the excavated soil into

Common Mole.

a little ridge or into little hills. The common mole is found in America from Canada to Florida, and Europe, except in the extreme south and north. It is from 5 to 6 in. long; its head is large, without any external ears; and its eyes are very minute, and concealed by its fur, which is short and soft. The common belief that the mole is blind is erroneous. Its fore-legs are very short and strong, and its snout slender, strong, and tendinous. The Cape mole, or changeable mole is remarkable as being the only mammal that exhibits the splendid metallic reflection which is thrown from the feathers of many birds. The "star-nosed moles" of North America are so named from the star or fringe-like arrangement of the nasal cartilages. The shrew moles of North America are more properly included among the shrews.

Mole Cricket, a name given to certain insects from the peculiar similarity of the anterior extremities of the species, and from the resemblance in their habits to those of the mole. The best-known species common in the U. S. are about 1½ in. long and of a brown color. In making its burrows it cuts through the roots of plants and commits great devastation in gardens. A larger species is found in South America.

Mol'ecule, a chemical term signifying the smallest quantity of a compound body or group of atoms which can enter into any chemical reaction. For instance, the molecule of ammonia is NH_3, the atomic weight or combining equivalent of which is 17, the weight of the hydrogen atom being taken as unity, that being the smallest quantity of ammonia which enters into combination. The molecule of water is H_2O, the atomic weight of which is 18, as no smaller quantity can be made to enter into combination or separated from any compound containing it. The molecule of hydrochloric acid is more simple; it is HCl, the atomic weight of which is 36.5. The hydrogen in hydrochloric acid can be replaced by one atom only of another element or by another compound molecule, in water by two atoms or molecules, in ammonia by three atoms or molecules—in each case forming another compound having the same general type.

Molecule is, in fact, the name given to the ultimate groups of atoms of which matter is composed. In pure elementary bodies the molecules would be, by the hypothesis, actual atoms or combinations of atoms with each other (an atom being an inconceivably minute and indivisible portion of homogeneous matter), but in all compound bodies the ultimate particles are of course not atoms, but groups of dissimilar atoms. For instance, the ultimate particles of water are not atoms, sometimes of oxygen, sometimes of hydrogen, but they are molecules or combined groups, always composed either of one atom of oxygen with two of hydrogen or of a multiple of that proportion.

Molecular forces are the forces which bind together the atoms into molecules, and which regulate the relations of the molecules themselves, so that the body made up of them assumes the solid, liquid, or gaseous state.

Molfetta, an Italian seaport on the Adriatic, on the railway from Ancona to Brindisi, 15 mi. w.n.w. of the city of Bari. It has manufactures of linen and salpeter; a harbor, well sheltered except on the north; and a considerable trade. Pop. 30,056.

Molière (mol-yār) (1622–1673), the assumed name of Jean Baptiste Poquelin, French comic dramatist, b. at Paris. His father was a tradesman connected with the court, and he received a good education. He studied law, but gave it up for the career of an actor, assuming in this profession the name of Molière. After obtaining great success in the provinces he settled in Paris in 1658, having previously produced his two comedies *L'Etourdi* and *Le Dépit Amoureux*. In the following year his reputation was greatly advanced by the production of the *Précieuses Ridicules*, a delicate satire on the prevailing affectation of the character of *bel esprit*, on the pedantry of learned females, and on affectation in language, thoughts, and dress. It produced a general reform when it was brought forward in Paris. Continuing to produce new plays, and performing the chief comic parts himself, he became a great favorite both with the court and the people, though his enemies, rival actors and authors, were numerous. Louis XIV was so well pleased with the performances of Molière's company that he made it specially the royal company, and gave its director a pension. In 1662 Molière made an ill-assorted marriage with Armande Béjart, upward of twenty years younger than himself, a union that embittered the latter part of his life. Among his works other than those mentioned may be noted: *L'Ecole des Maries*, *L'Ecole des Femmes*, *Le Mariage Forcé*, *Don Juan*, *Le Misanthrope*, *Le Médecin Mlgré lui*, *Le Tartufe*, *L'Avare*, *George Dandlin*, *Les Fourberies de Scapin*, *Le Bourgeois Gentilhomme*, *Le Malade Imaginaire*, etc. Molière died of an apoplectic stroke, a few hours after playing in the latter. As a player he was unsurpassed in high comic parts; and in the literature of comedy he bears the greatest name

among the moderns after Shakespeare. He borrowed freely from Latin, Spanish, and Italian writers, but whatever materials he appropriated he so treated them as to make the result entirely his own and original. The Archbishop of Paris at first refused him burial as being an actor and a reviler of the clergy, but the king himself insisted on it.

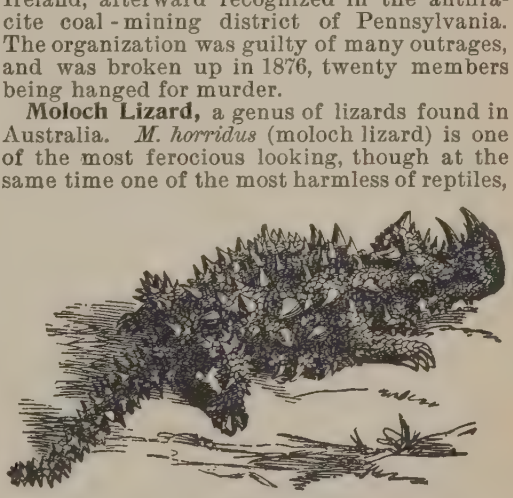
Moline, Rock Island co., Ill., on Mississippi River, 178 mi. w. of Chicago. Railroads: C. B. & Q.; C. M. &. St. P.; and C. R. I. & P. It is an important manufacturing center. Industries include plow and elevator factories, pump, boiler, scale, organ, flour, and paper works. Pop. 1900, 17,248.

Mollah, an honorary title accorded to any one in Turkey who has acquired respect from purity of life, or who exercises functions relating to religion on the sacred or canon law. The title is not conferred by any special authority, but springs spontaneously from public respect. It is nearly equivalent to *master, excellency,* in English.

Mollus'ca, an animal sub-kingdom, comprising those soft-bodied animals known as slugs, snails, limpets, oysters, cockles, etc. In some the body is naked and unprotected, in others it is enclosed in a muscular sac, but the great majority are provided with an exoskeleton or *shell.* The shell-bearing mollusks are popularly divided into *univalves, bivalves,* and *multivalves.* The univalves are those whose shell consists of only a single piece, often open and cup-shaped, as in the limpet, or more commonly of a long cone wound spirally round a real or imaginary axis, as the garden snail, the whelk, or periwinkle. The bivalves are those of which the shell is formed of two pieces joined by a hinge, as the cockle and oyster. The multivalves have the shell composed of several pieces. These latter mollusks are few in number. The shells of the Mollusca are secreted by the soft integument or *mantle.* The chief mass of the shell is made up of carbonate of lime with a small proportion of animal matter. The Mollusca have a distinct alimentary canal, shut off from the general cavity of the body, and situated between the blood system, which lies along the back, and the nerve system, which is toward the ventral aspect of the body. The digestive system consists of a mouth, gullet, stomach, intestine, and anus, except in a few forms, in which the intestine ends blindly. The blood is almost colorless. Respiration is variously effected; in the lamp shells, by long ciliated arms springing from the sides of the mouth; in the bivalve shellfish, the cuttlefishes, and most of the univalves, by gills; while in the remainder of the univalves, as snails, slugs, etc., the breathing organs have the form of an air chamber or pulmonary sac, adapted for breathing air directly. A characteristic of the typical Mollusca is the "foot" or organ of locomotion, which may be modified so as to perform various offices. Its use in the case of the snail is well known, and in the cockle it is developed to a great size. In some cases (as the razor shells) it enables the animal to burrow rapidly in the sand; while in the mussels, etc., the organ is devoted to the secretion of the well-known beard or *byssus,* a collection of strong fibrous threads by means of which these animals moor or fix themselves to rocks, etc. In some bivalves (as the oyster) in which the locomotive powers are in abeyance, the foot is rudimentary. In the cuttlefishes it is represented by the arms or tentacles round the mouth. The chief peculiarity, however, of the Mollusca is in the nervous system, which in the lower forms consists essentially of a single ganglionic mass, giving off filaments in various directions; while in the higher there are three such masses, united to one another by nervous cords. According as they possess one or three ganglia the Mollusca are divided into two great divisions — *Molluscoida,* those having a single ganglion or principal pair of ganglia, and the *Mollusca proper,* possessing three principal pairs of ganglia.

Molly Maguires, the name assumed by members of a secret illegal association in Ireland, afterward recognized in the anthracite coal-mining district of Pennsylvania. The organization was guilty of many outrages, and was broken up in 1876, twenty members being hanged for murder.

Moloch Lizard, a genus of lizards found in Australia. *M. horridus* (moloch lizard) is one of the most ferocious looking, though at the same time one of the most harmless of reptiles,



Moloch.

the horns on the head and the numerous spines on the body giving it a most formidable and exceedingly repulsive appearance.

Molokai, an island of the Hawaiian group, about 40 mi. long by from 7 to 9 broad. It is noted for its settlement of lepers, all persons on the islands found to be effected with the disease being sent by government to Molokai, and kept entirely isolated from the healthy part of the community. Pop. 2,581.

Moltke (molt'kĕ), Helmuth Carl Bernhard, Count von (1800–1891), German field marshal, b. near Mecklenburg; entered the Danish army in 1819; left that service for the Prussian in 1822, and became a staff officer in 1832. In 1835 he superintended the Turkish military reforms, and was present during the Syrian campaign against Mehemet Ali in 1839. He returned to Prussia and became colonel of the staff in 1851, and equerry to the crown prince in 1855. In 1858 as provisional director of the general staff he acted in unison

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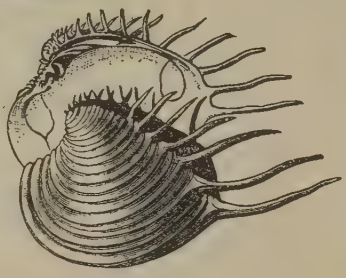

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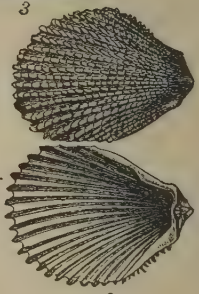

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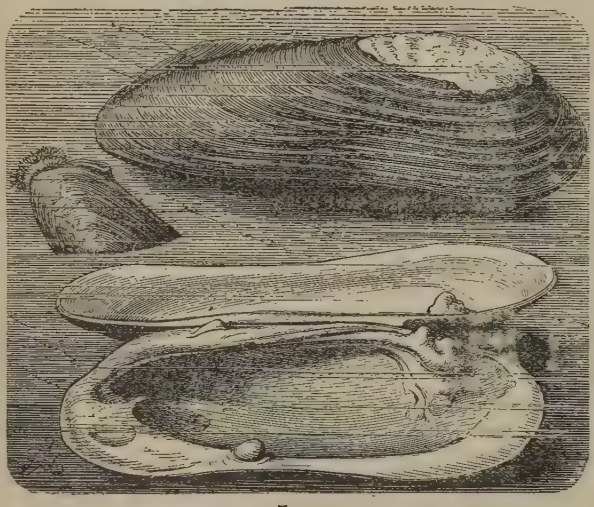

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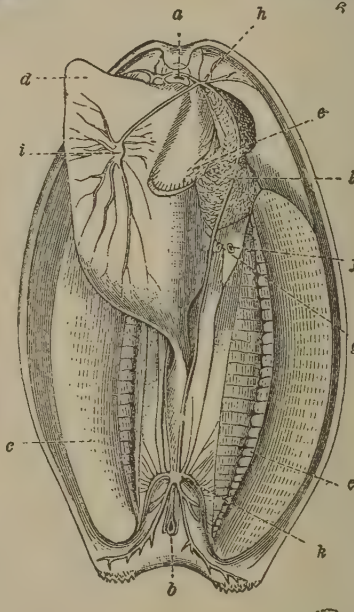

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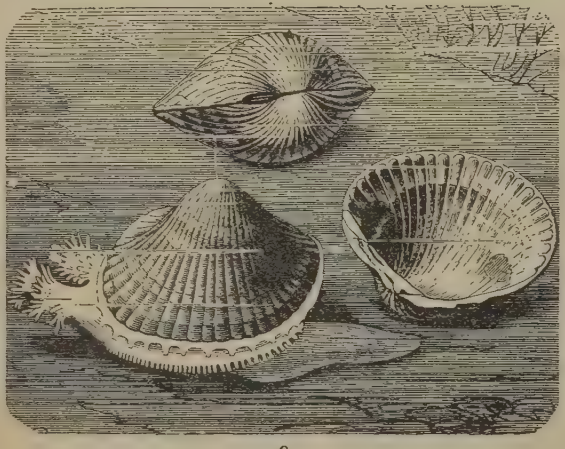

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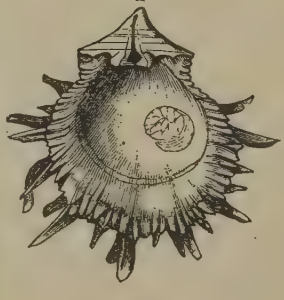

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1. Scalloped-shaped Snail. 2. Common Shell. 3. Bird-shell. 4. Valve-shells, Artic seas. 5. Horned Venus-shell. 6. Snail with file-shaped shell. 7. River Peel Shell. 8. Pond-snail. 9. Eatable Heart-shell. 10. Valve-shell. 11. Donax, Oval-shaped Shell, Saw-tooth Rim.

with Von Roon and Bismarck in the vast plans of military reorganization soon after carried out. The conduct of the Danish War (1864) was attributable to his strategy, as was also the success of the Austro-Prussian War of 1866, and the Franco-Prussian War of 1870–71. In the latter year he was made field marshal, and became count in 1872. He retired from the position of chief of the general staff in 1888.

Moluc'cas (or Spice Islands), a name applied to the widely scattered group of the Malay or Indian Archipelago, lying between Celebes and Papua, between lat. 3° s. and 6° n., and lon. 126° to 135° e. They are divided into the residences of Amboyna, Banda, Ternate, and Menado; the southern portion being governed directly by the Dutch, and the northern indirectly through native sultans. The area is about 45,000 sq. mi., and the population 500,000. The islands (some hundreds in number) are nearly all mountainous, mostly volcanic, and earthquakes are by no means uncommon. Cloves, nutmegs, mace, and sago are exported to Europe; and birds' nests, trepang, etc., to China. The Moluccas have been for centuries alternately in the possession of the Spaniards, Portuguese, and Dutch. They were twice taken by the British and given up to Holland, in whose possession they still remain. The natives belong to Malay and Polynesian races, and the general language on the coast is the Malay.

Momba'sa (or Mombas), a town on the east coast of Africa, in lat. 4° 6′ s., on an island 3 mi. long by ½ mi. broad, with one of the best harbors on the coast. The island and town now form part of the territory over which the British East African Company received governing rights from the sultan of Zanzibar in 1888. The town is dirty and unhealthy, but exports millet, Indian corn, ivory, copal, sesamum (oilseed), etc. Pop. 20,000. On the mainland opposite is Freretown, a settlement of the Church Missionary Society.

Momen'tum, the quantity of motion of a moving body, measured as the product of the body's mass and its velocity. The unit quantity of momentum most commonly employed is that possessed by a body of the mass of 1 lb. moving with a velocity of 1 ft. per second. The C.G.S. (Centimeter, Gramme, Second), unit is the momentum possessed by a body of the mass of 1 gramme moving with a velocity of 1 centimeter per second.

Mommsen, THEODOR (1817-1903), German scholar and historian. He was appointed professor of jurisprudence at Leipsic in 1848; professor of Roman law at Zürich in 1852; obtained a similar chair at Breslau in 1854; in 1858 went to Berlin as professor of ancient history. His best-known work is a history of Rome, which has been translated into English by W. P. Dickson; but he has also published many other works on Roman history, law, and antiquities. He died Nov. 1, in Berlin.

Mompox', a town in the Republic of Colombia, South America, on the Magdalena, 125 mi. s. of Baranquilla. Founded in 1538, it was at one time of considerable commercial importance, but the capricious changes of the river's course have seriously injured its prosperity. Pop. 10,000.

Momus, the god of mockery and censure among the ancients, was the son of Night. He was expelled from heaven for his free criticism of the gods. Momus is generally represented raising a mask from his face, and holding a small figure in his hand.

Mon'aco, a principality lying between the French department Alpes Maritimes (Nice) and the Mediterranean. In 1861 the Prince of Monaco sold the departments of Mentone and Roccabruna to France for 4,000,000 francs ($800,000); and the principality has since then been confined to an area of about 8 sq. mi. with a population of 10,108. The prince exercises both legislative and executive functions, while the people are exempt from taxation, as the revenue is almost entirely derived from the rents of the gaming establishment. The capital, MONACO (pop. 2,879), situated on a rocky height projecting into the sea, is a renowned watering place. About a mile to the east is Monte Carlo, a collection of hotels and villas which have sprung up near the luxurious gardens of the handsome gambling casino, established here in 1860. This institution is now the property of a joint stock company. The inhabitants of Monaco (*Monégasques*) are not admitted to the gaming tables.

Mon'aghan, a county of Ireland in Ulster; area 319,741 acres, of which a great part is arable. The deep soil is favorable to the culture of flax, and the other chief crops are oats and potatoes. Spade husbandry is much practised; the culture of green crops is increasing, and the linen manufacture is reviving. Monaghan is the county town. The manufacture of linen is the chief employment.

Monarchy is a state or government in which the supreme power is either actually or nominally vested for life in a single person, by whatsoever name he may be distinguished. A monarchy in which the subjects have no right or powers as against the monarch (e. g., Persia) is termed *despotic* or *absolute;* when the legislative power is wholly in the hands of a monarch, who, however, is himself subject to the law (e. g., Russia), it is termed *autocratic;* but when the monarch shares the power of enacting laws with representatives of the people, the monarchy is *limited* or *constitutional* (e. g., Great Britain). In ancient Greece, a monarchy in which the ruler either obtained or administered his power in violation of the constitution was termed a *tyranny*, however beneficent and mild the rule might be. Monarchies are either *hereditary*, as in Great Britain, or *elective*, as was formerly the case in Poland.

Monasteries and Monachism, OR MONASTICISM.—A monastery is a house of retreat from the allurements of the world, where men and women devote themselves to acts of self-denial and pious avocations. The occupants of such a place are termed monks and nuns.

The monastic vows are three in number: poverty, chastity and obedience. The vow of

poverty prevents the monks from holding any property individually. Monasteries, however, professing merely a high degree of poverty may possess real estate, yet not more than enough for their support, as the Carmelites and Augustinians. In the higher degree a monastery may hold any personal property, as books, dress and supplies of food and drink. The Dominicans are monks of this class. The highest degree absolutely forbids both real and personal property, as is the case with the Franciscans, especially the order known as Capuchins. The vow of chastity requires an entire abstinence from familiar intercourse with the other sex, and that of obedience entire compliance with the rules of the order and the commands of the superior.

Egypt was the country where monasteries were first founded. The persecutions of Decius in the third century caused thousands of Christians to seek in desert seclusion security in the exercise of religion. St. Anthony was the founder of monasticism, yielding to the appeals of hermits less learned than himself, who desired the benefit of his wisdom and sanctity. Contemporaneous with him was St. Pachomius (A. D. 315), who founded several monasteries in the Thebaid of the Coenobitic order, which characterizes nearly all the modern ascetic communities. Hilarion, who was a disciple of St. Anthony, first introduced monasticism into Palestine. St. Athanasius inspired the Christians of Rome with a fervor for religious retirement by preaching on the asceticism of St. Anthony and his disciples. St. Martin founded two celebrated monasteries in France. In the beginning each religious house had its own rule, but that of St. Basil was ultimately adopted by the monks of Western Europe, who were known as Basilians. Besides being the most numerous of any in the world, the monasteries of Ireland were the most ancient. When St. Patrick landed in that island he discovered that he was preceded by four Christian apostles who had founded monasteries in different parts. St. Patrick founded a large number of monasteries, in which he was emulated by many of the Irish anchorites, until in the seventh century Ireland had monasteries which were celebrated all over Europe, not only for their sanctity but for their learning. There were originally 13 orders in Ireland, differing from each other only in discipline and dress. They were called by the names of their founders or patrons, but were subsequently known either as Augustinians or Benedictines. Western monasticism, which rapidly spread during the fifth century, was accompanied by many irregularities until monastic vows were introduced in the sixth century by St. Benedict. The monasteries of the West now became the dwellings of piety, industry and temperance and the refuge of learning. Missionaries were sent out from them; deserts and solitudes were made habitable by the industrious monks, and in promoting the progress of agriculture and converting the German and Slavonic nations they rendered great services to the world from the sixth century to the ninth. Another incalculable benefit conferred upon civilization by the monasteries is the preservation of nearly the whole of the classic and medieval manuscript literature that we possess. The most famous of these great centers of piety and culture were the monasteries of St. Gall in Germany, St. Denis in France and Yarrow in England. St. Benedict also instituted monasteries for women.

Among the most important orders for men founded in the Middle Ages were the Congregation of Cluny, the Camaldolites, the Cistercians, the Carthusians, the Franciscans and the Dominicans. The Congregation of Cluny, an offshoot of the Benedictines, was founded in 912 by St. Benno. It attained great wealth and political influence, but became extinct in the eighteenth century. The fine Abbey Church dedicated in 1131 was one of the wonders of the world. Among the great men associated with its work were St. Mayeul, Odilo, Pope Urban II and Peter the Venerable. The Camaldolites were founded in 1012 in the vale of Camaldoli by St. Romuald. The Cistercians, founded in 1098 by St. Robert in the district of Citeaux, was once one of the most flourishing orders, but is now almost extinct. Its many great convents in Europe were almost all destroyed during the sixteenth century. The Carthusians were founded at Chartreuse in the eleventh century by St. Bruno of Cologne. Their monastery *La Grand Chartreuse* was one of the most magnificent in the world. They lived an austere life, spent chiefly in reading and prayer, and copying of manuscripts. They dwelt in almost unbroken silence and hence are often referred to in literature as the "silent Carthusians." The Franciscans, founded in 1209, by St. Francis of Assisi, were the first of the mendicant orders. Wherever they went they built monasteries and churches, noted for their fine wall paintings and beautiful altars. One of the finest was at Assisi. With their idealism and religious fervor they bore an active part in the revival of art. They also gave some celebrated names to theology and philosophy, as Saint Bonaventura, Duns Scotus, William of Occam and Roger Bacon. The Dominicans were also mendicants. Their first monastery was at Toulouse. Other celebrated houses of the Order were "Black Friar" House at Oxford and St. Jacques at Paris. The military orders, such as the Knights Hospitalers and Knights Templars, which developed in the twelfth century, took in addition to the usual three vows of a monk a fourth vow of making war on the infidels for the defense of Christendom. At Jerusalem they had a house known as a *hospital* where they were bound to harbor pilgrims visiting the holy city.

Among the more modern religious orders are the Capuchins, really a branch of the Franciscans, founded in 1526 by Matteo di Bassi of Urbino. They are so called from the shape of the cowl. The order has produced many men famous for their profound

learning and Christian virtues, one of the most illustrious being Saint Fidelis. The Capuchins are widely represented to-day. They have large monasteries in Austria and Italy. In the United States they have important houses in Detroit and Pittsburg. The Society of Jesus, founded in 1534 by Ignatius Loyola, is the latest of the great religious orders. Their history is marked by ceaseless activity and the order is one of the most flourishing and useful of the present day. Their monasteries were the chief educational centers in the sixteenth century and their schools are to-day recognized among the foremost institutions of learning. See *Jesuits.*

The earlier monastic communities for women were usually outgrowths of the orders for men. Such orders exist, for example, under the rules of the Benedictine, Cistercian, Dominican and Franciscan orders. Until the seventeenth century they were nearly all cloistered communities, but now the majority of the orders take active part in charitable work among the poor, sick and ignorant. One of the oldest orders is that of the Ursuline Sisters, founded in 1537 by St. Angela Merici of Brescia. This is a teaching order. Their first convent instituted in the United States was founded by French nuns at New Orleans in 1727.

The development of monasticism has, on the whole, been steady, though at times persecution and confiscation for political and pecuniary reasons have reduced the numbers of religious communities and impoverished the surviving orders. The beginning of the twentieth century finds monasticism in a flourishing condition, especially in those countries where there is no legislative restriction upon monastic life.

Monas'tir (or Bitolia), a city of European Turkey, 100 mi. n.w. of Salonica. Being the central military station of Macedonia, and carrying on a large trade with Constantinople, Salonica, Vienna, and Trieste, Monastir is a place of remarkable activity. Pop. about 25,000.

Money.—The term money is used, both in matters of business and in economic theories, in such very different ways that it is impossible to cover them all with a simple definition. Standard coins, bars of bullion which can at once be converted into standard coins, token coins, convertible bank notes, inconvertible notes, are all included under "money," though they present essential differences. In modern societies one of the most important forms of money is "bank money," or the money of the money market, which for the most part consists of neither coin nor notes. A brief survey of the development of the complex monetary system of modern societies from its rudimentary forms will give the best explanation of this uncertainty in the meaning of this familiar word, and also bring out in the clearest way the principal functions of "money."

Exchanges first take place by means of barter, but the difficulties of simple barter are obviously very great. A coincidence of mutual wants at the same time and place is the first condition of any exchange, and it is plain that a common *medium of exchange* will obviate one of the principal difficulties of direct barter. If there is some one thing which every one is willing to take, it follows that anything else can be bought or sold against this particular commodity. Accordingly the first function of "money" is to provide 1, a *medium of exchange,* and its first forms consist of things which are generally desired in simple states of society. Skins, cattle, shells, corn, pieces of cloth, mats, salt, and many other commodities have at different times and places been used as "money," in the sense of a common medium of exchange. The commodity chosen, however, will be of little advantage unless it can be used both in large and small quantities. This consideration leads to another primary function of money—viz., 2, as a *measure of value.* Not only is it necessary that things can be exchanged against a common substance, but the rates of exchange must be measured. Finally, as society advances, a basis for 3, *deferred payments,* and also a method of 4, *storing "values"* without deterioration, become of importance. In order that these four primary functions may be fulfilled, the substance chosen for money must have certain properties, of which the principal are portability or great value in small bulk, durability, sameness of quality, divisibility, stability of value, and cognizability. It was soon discovered that these qualities are possessed in the highest degree by gold and silver. Other metals have been used at different times even for standard money, but all of them fail in one or more of these particulars. Iron is liable to rust, lead is too soft, tin too brittle, and copper too heavy. It may be observed that the importance of qualities varies according to circumstances. Thus, when, as in modern societies, the greater part of wholesale transactions are effected without the intervention of material money, portability is of comparatively small importance, while on the other hand stability of value is of the greatest importance in all kinds of deferred payments. It is not necessary that all the primary functions of money should be fulfilled by the same thing.

It is necessary to notice the distinction between standard money, in the proper usage of the term, and token money. The chief characteristics of the former are that, as just explained, it is coined to an unlimited extent, and further, that for any money contracts it is unlimited legal tender. In "token" money these two characteristics are absent. The nature and uses of token money are also best explained historically. In the Middle Ages silver was very scarce, and prices were extremely low. The silver penny was originally about the size of the present threepenny piece; consequently for the low range of prices then current it was inconveniently large and valuable. In a petition of the date of 1330 it was pointed out that "beer is one penny for three gallons," and that a penny is the small-

est coin, and the petitioners pray that smaller coins may be struck to pay for their little purchases, and "for works of charity." The great practical difficulty, however, was to make very small coins of full standard value. So much was the need of small change felt, however, that the people had resorted largely to "tokens" of lead, tin, and even leather. These "tokens" were at first private issues, and practically were like very small promissory notes. It was soon found that they were forced into circulation by unfair means, and then the issuers refused to change them for goods of sterling money. With the progress of civilization "representative money," as it has happily been styled by Jevons, became of more and more importance. The Romans, for example, had a highly-developed banking system, which, however, was broken up on the disruption of the empire. In the early mediæval period bills of exchange were used for foreign payments; and that they were considered as "representative money" is shown by the fact that in England, up to the Tudor period, their value was regulated by the Royal Exchanger, a high official connected with the mint. The development of banking in the modern sense was very slow. The earliest banks in Italy were finance companies which provided governments with loans, but the great banks of the north of Europe were expressly designed to provide good money to meet the payment of bills of exchange. The money in the great trading centers was drawn from various countries, and was in general debased and worn. The banks took this bad money from the merchants and gave them good bank money in return. The merchants, however, allowed the money to remain in the bank, and handed one another transfers. It was soon discovered that a small amount of actual coin was sufficient to meet all liabilities, and accordingly, the remainder was lent. In this manner "bank money" has in process of time come to consist of a large mass of representative money supported on a metallic basis.

The money unit in various countries is as follows: U. S., the gold dollar; England, the pound sterling; Belgium, France, and Switzerland, the franc; Germany, the mark; Austria-Hungary, the florin; Russia, the ruble; Italy, the lira; Spain, the peseta; Sweden, Norway, and Denmark, the krona; Holland, the guilder; Portugal, the milreis; Greece, the drachma; Turkey, the piaster; Brazil, the milreis; India, the rupee; China, the liang or taël: Japan, the yen.

Mongolia, a vast region of the northeast of Asia, belonging to the Chinese Empire, is situated between China Proper and Asiatic Russia; estimated area 1,400,000 sq. mi. A great part of it is occupied by the desert of Gobi or Shamo, and on or near its borders are lofty mountain chains, the principal of which are the Altai, the Sayansk, the Khinghan, and the Inshan. The inhabitants (estimated at 2,000,000) lead a nomadic life. They possess large herds of cattle, sheep, and horses. The climate is intensely hot in summer and bitterly cold in winter.

Mongols, a race of people in the northeast of Asia, whose original seat seems to have been in the north of the present Mongolia, and in Siberia to the southeast of Lake Baikal. Their first great advance was due to Genghis Khan, who having been, originally, merely the chief of a single Mongol horde, compelled the other hordes to submit to his power, and then, in 1206, conceived the bold plan of conquering the whole earth. After the death of Genghis Khan, in 1227, his sons and grandsons pursued his conquests, subjugated all China, subverted the caliphate of Bagdad (1263), and made the Seljuk sultans of Iconium tributary. In 1237 a Mongol army invaded Russia, devastated the country with the most horrible cruelty, and from Russia passed, in two divisions, into Poland and Hungary. At Pesth the Hungarian army was routed with terrible slaughter, and at Liegnitz, in Silesia, Henry, duke of Breslau, was defeated in a bloody battle, April 9, 1241. The empire of the Mongols was at the summit of its power during the reigns of Mangu Khan (1251–59), and Khubîlai or Kûblai Khan (1259–94), the patron of Marco Polo. At that time it extended from the Chinese Sea and from India far into the interior of Siberia, and to the frontiers of Poland. The principal seat of the *khakan* or great khan was transferred by Khubilai from Karakorum to China; the other countries were governed by subordinate khans, all of whom were descended from Genghis, and several of whom succeeded in making themselves independent. The division of the empire was the cause of the gradual decay of the power and consequence of the Mongols in the fourteenth century. The adoption of new religions (Buddhism in the East and Mohammedanism in the West), also contributed to their fall. In 1368 the empire of the Mongols in China was overturned by a revolution which set the native Ming dynasty on the throne. Driven northward to their original home, the eastern Mongols remained for a time subject to the descendants of Genghis Khan, but gradually splitting up into small independent tribes they finally were subdued and absorbed by the Manchu conquerors of China. Of the western Mongols the most powerful were the Kipchaks or Golden Horde, who lived on the Volga, and the khanate founded in Bokhara, on the Oxus, by Jagatai, the eldest son of Genghis Khan. The former gradually fell under the power of the Russians; but among the latter there appeared a second formidable warrior, Timurlenk (Tamerlane), called also Timur Beg. In 1369 he chose the city of Samarcand for the seat of his new government. The other Mongol tribes, with Persia, Central Asia, and Hindustan, were successively subjugated by him. In 1402, at Ancyra (Angora), in Asia Minor, he defeated and captured the Sultan Bajazet I, who had been hitherto victorious against the Christians in Europe, and before whom Constantinople trembled. After Timur's death in 1405, his empire barely held together until 1468, when it was again divided. Baber (Ba-

bur), a descendant of Timur, founded in India, in 1519, the empire of the Great Mogul, which existed in name till 1857, though its power ended in 1739. After the commencement of the sixteenth century the Mongols lost all importance in the history of the world, became split up into a number of separate khanates and tribes, and fell under the power of the neighboring peoples. Their name still lingers in the Chinese province of Mongolia (see above), but Mongolian tribes are found far beyond its boundaries.

The term Mongolians or Mongolidæ is to some extent used by anthropologists to signify a very large division of the races of men, of which the Mongols proper were considered typical. This use of the name, which includes Tartars, Turks, Finns, Chinese, and Japanese, is to be carefully distinguished from the historical use.

Monier-Williams, Sir Monier (1819–99), Orientalist, b. at Bombay, where his father, Colonel Monier-Williams, held the post of surveyor general. He was educated at King's College, London, and Baliol and University Colleges, Oxford. He was professor of Sanskrit at Haileybury from 1844 to 1858, and in 1860 became Boden Sanskrit professor at Oxford. He is a fellow of Baliol, and holds the honorary degrees of D.C.L. and LL.D.; is the author of a Sanskrit grammar, a Sanskrit dictionary, *Hinduism*, *Modern India*, *Religious Thought and Life in India*, etc. He has traveled extensively in India, and was knighted in 1886.

Monitor, the type of a family of lizards. They are the largest of the lizard order, some species of the Nile and Egypt attaining a length of 6 ft. They generally inhabit the neighborhood of rivers and lakes, and feed upon the eggs of crocodiles, turtles, and those of

Monitor.

aquatic birds. The name is owing to the belief formerly entertained that these lizards gave warning of the approach of crocodiles.

Monitor, the popular name for a class of very shallow, heavily-armed ironclad steam vessels, invented by Ericsson, carrying on their open decks either one or two revolving turrets, each containing one or more enormous guns, and designed to combine the maximum of gun power with the minimum of exposure. Monitors are so called from the name of the first vessel of the kind, built during the Civil War, which proved its superiority in a famous engagement with the *Merrimac* in 1862.

Monk, George (1608–1670), duke of Albemarle, an English general, famous for the prominent part he took in the restoration of Charles II. In the struggle between Charles I and the Parliament Monk at first joined the royalists; but in January, 1644, he was taken prisoner at the siege of Nantwich, and after a short delay he was committed to the Tower. After the capture of the king, Monk took the Covenant and regained his liberty, in 1646. Under the Parliament he served in Ireland, and subsequently with Cromwell in Scotland, and in 1650 he reduced that country to obedience within a few weeks. In 1653 he assisted Admiral Dean in inflicting two severe naval defeats on the Dutch under Van Tromp the elder. Monk had always been regarded with hope by the royalist party, and he seems to have decided at once upon the restoration, although he used all his unusually great powers of dissimulation, and even of deceit, to avoid committing himself either one way or the other until he was tolerably sure of success. The coming over of Charles II was arranged with Monk, and the king rewarded his restorer with the dukedom of Albemarle, the Order of the Garter, and with a pension of £7,000 ($35,000) a year. Monk now fell into comparative obscurity. He was buried in Westminster Abbey.

Monkeys, the popular name applied sometimes to the whole of the great mammalian

a.—American. *b.*—Old World Monkeys.

order Quadrumana, sometimes limited to those of the order that have tails, and generally cheek pouches, to the exclusion of the apes, baboons, and lemurs. The general characters of the quadrumanous mammals are found in the great toe being opposable to the other digits of the foot, so that the feet become converted into "hands." The monkeys may all be divided into a lower and a higher section. The higher section is that of the *Catarhina* or Old World monkeys. The catarhine monkeys are distinguished by their obliquely set nostrils, the nasal apertures being placed close together, and the nasal septum being narrow. Opposable thumbs and great toes exist in nearly all. The tail may be rudimentary or wanting, but in no case is it prehensile. Cheek pouches, which are used as receptacles

for food preparatory to its mastication, are present in many; and the skin covering the prominences of the buttocks is frequently destitute of hair, becomes hardened, and thus constitutes the so-called *natal callosities*. The catarhine monkeys inhabit Asia and Africa. They include the anthropoid or man-like apes, the gibbons, the orang, the chimpanzee and the gorilla, the baboons and mandrills, the sacred monkey of the Hindus, the proboscis monkey, the Diana monkey, the mona, the wanderoo, etc. The lower section of monkeys consists of the *Platyrhina* or New World monkeys, which are entirely confined to South America. They have the nostrils widely separated, the septum or partition between being broad, hence the name. Another peculiarity consists in their prehensile tails; and there are none of the cheek pouches or hard callosities on the rump so characteristic of Old World monkeys. The diet is especially of a vegetable nature. This section includes the marmosets, the spider monkeys, the capuchin monkeys, the squirrel monkeys, the howling monkeys, etc.

Monmouth, Warren co., Ill., 180 mi. s.e. of Chicago. Railroads: C. B. & Q., main line; and C. B. & Q., St. L. & R. I. div.; and the Iowa Central. Industries: pottery co., flouring mill, mining and manufacturing co., plow works, soap, cigar, and other factories. Coal in vicinity. Surrounding country agricultural and stock raising. Seat of Monmouth College. The town was first settled in 1831, and became a city in 1852. Pop. 1900, 7,460.

Monmouth, Battle of, fought between the American and British forces near Monmouth, N. J., June 28, 1778. The Americans were commanded by Washington and the British by Clinton. Washington's purpose was to strike a blow which would cripple the British army. He secured a position on June 27, at Allentown, N. J., to command the British flank. The British then turned east, and Washington's purpose was to crush their left wing, which was moving in the rear. To accomplish this he sent General Charles Lee (which see) with 6,000 men. Lee retreated without striking a blow, and it was only by the arrival of Washington that a disastrous rout was prevented. The result was a drawn battle and Clinton made his escape to New York. The American loss was 362; the British lost 416.

Monmouth, James, Duke of (1649–1685), the natural son of Lucy Walters, one of the mistresses of Charles II, was b. at Rotterdam, and was always acknowledged by Charles as his natural son, though there were doubts of his paternity. After the Restoration he was created Duke of Orkney and Duke of Monmouth (1663), married the daughter and heiress of the Earl of Buccleuch, and received the Garter. In 1679 Monmouth was intrusted with a command in Scotland, and defeated the Covenanters at the battle of Bothwell Bridge, June 22, but was soon afterward sent beyond seas at the instigation of his uncle. A few months afterward he returned without leave, and became the center of the popular movement in which the lives of Lord William Russell and Algernon Sidney were sacrificed. The result to Monmouth was his exile in Holland. On the accession of James II he was induced to attempt an invasion of England. His small body of undisciplined troops was totally defeated at Sedgmoor, and the duke himself was captured and beheaded July 15, 1685, after abject appeals to the king for mercy.

Mon'ochord, a musical instrument with one string, much employed by the ancients in the musical training of the voice and ear. The string, stretched over a board or sounding box, emits a musical note on being caused to vibrate. The length of the vibrating part of the string may be altered at will by means of a movable bridge, and the relative pitch of the different notes thus produced compared. A modified, or rather developed, form of the instrument is employed to exhibit the law of vibrating strings, and also to illustrate the relations of harmonics and the fundamental ideas of undulations.

Monoma'nia, the name given by some physicians to that form of mania in which the mind of the patient is absorbed by one morbid idea or impulse, and the person seems to be insane only in one direction. Dipsomania and kleptomania are regarded as two varieties of monomania.

Monomet'allism, the principle of having only one metallic standard in the coinage of a country; opposed to *bimetalism*.

Monongahe'la, a river of the U. S., formed by the union of West Fork and Tygart's Valley River in West Virginia, runs north into Pennsylvania, and unites with the Alleghany, at Pittsburg, to form the Ohio. It is navigable for large boats 60 mi., and for small boats 200 mi. from its mouth. Its length to the source of the Tygart's Valley River is 300 mi.

Monoph'ysites, those who maintained that there was but one nature in the incarnate Christ, that is, that the divine and human natures were so united as to form but one *nature*, yet without any change, confusion, or mixture of the two natures. They were condemned as heretics by the Council of Chalcedon in 451.

Monop'oli, a seaport of South Italy, on the Adriatic, in the province and 25 mi. e.s.e. of Bari. It has manufactures of woolen and cotton cloth, and a trade in wine and olives. Pop. 20,918.

Monopoly is properly definable as the sole or exclusive right of selling or trading enjoyed by an individual or group of individuals. In its strict sense monopoly belongs to an economic era which has passed away. During mediæval times and the period that followed, exclusive rights prevailed in almost all departments. There were manorial rights which circumscribed individual action. The city and the guild had their spheres of production and of trade more or less clearly defined, and more or less thoroughly recognized in practise. The central governments which arose on the ruins of the mediæval system continued to recognize such exclusive rights, sometimes conferring on favored individuals the sole privilege of selling the most necessary articles of life, in

other cases granting to great companies the monopoly of trade over immense regions of the world. It is with these instances that the name monopoly is most strictly associated in history. The last Parliament of Elizabeth, held in 1601, pronounced an emphatic condemnation of the monopolies granted by that queen, and even she had to yield to the storm. Salt and coal were among the articles whose sale was thus subject to monopoly. Curiously enough, the previous year saw the foundation by royal charter of the greatest of the companies which were based on the exclusive right of trade in an immense foreign market, the East India Company. The opposition to monopolies continued under the Stuarts, and their abolition may be regarded as one of the important results of the great parliamentary struggle of that time.

The spread of freedom has tended to the abolition of such monopolies, whether vested in individuals, in trade corporations, or in great companies engaged in foreign commerce. But, while the monopoly of law has so far passed away, new tendencies toward a monopoly of fact have been setting in. Under the prevalent system it is still the aim of the competitor to secure as far as possible the exclusive sale of the commodity in which he deals, either in the world market or over a given portion of it; and when the single competitor is not strong enough to accomplish this, he seeks to attain his object by combination with a group of those engaged in the same business. The modern *trust* syndicate or union is the outcome of such efforts; and the great danger attendant on such gigantic combinations is the establishment of a monopoly injurious to society. The trust considered in its social and economic aspects offers a wide problem for discussion; there can be no doubt that it establishes or seeks to establish a monopoly of fact. As regards the U. S. it may be maintained that such a monopoly is favored by protection; but in view of the fact that the same tendency is observable in England, where free competition with all the world exists, it should be considered whether such combinations are not a "natural" outcome of the prevailing economic system. We have here merely to point out that in all such combinations, whether operating over the whole world market or over a portion of it, the tendency toward a monopoly of fact is involved. In conclusion, reference should be made to monopolies, as in tobacco, retained by certain governments, but purely for revenue purposes. It was part of the later fiscal policy of Bismarck to establish such a state monopoly in spirits.

Mon'otheism, the belief in, and worship of, a single, personal God; opposed to polytheism and distinct also from pantheism. It was at one time the received opinion that monotheism was the primeval intuitive form of religion, but most recent authorities now hold that it was everywhere posterior to polytheism, whence it was evolved by a gradual education. *Henotheism,* which Max Müller and Schelling maintain to be the primeval form, is merely the rudimentary phase of polytheism in minds not yet conscious of the complexity of the problems for which polytheism is suggested as the solution by more developed intellects. The three great modern monotheistic religions are Judaism, Christianity, and Mohammedanism.

Monro', Alexander (1697–1767), distinguished as "Primus" or first, anatomist and founder of the Edinburgh Medical School, was b. in London. He took an active part in promoting the erection of Edinburgh Infirmary, and in establishing a connection between it and the medical faculty of the university. His principal works are, *Osteology, a Treatise on the Anatomy of the Human Bones and Nerves;* and an *Essay on Comparative Anatomy* (1733–47).

Monroe, Monroe co., Mich., on Raisin River, 2 mi. from Lake Erie. Railroads: L. S. & M. S.; Michigan Central, and F. & P. M. Industries include tile factories, nurseries, paper and flouring mills, sash and blind factories, foundries, etc. Exports telegraph poles. Produces also grain, grass, and fruits. Pop. 1900, 5,043.

Monroe (mon-rō'), James (1758–1831), president of the U. S. of America, was b. in Westmoreland co., Va.; d. at New York. He was educated at William and Mary College, and from 1776 till 1788 served in the Revolutionary army. He then devoted himself to the study of law. In 1782 and in 1787 he was elected a member of the Virginia Assembly, and from 1783 till 1786 he represented Virginia in Congress. In 1788 as a member of the Convention of Virginia he strenuously opposed the ratification of the new Federal Constitution. In 1790 he was elected to the Senate of the U. S. In 1794–96 he was minister plenipotentiary to France. From 1799 till 1802 he was governor of Virginia, and in 1803 he returned as envoy extraordinary to France on a mission which resulted in the acquisition of Louisiana for $15,000,000. He was afterward employed in diplomacy in England and Spain. In 1811 he was governor of Virginia, in 1811–14 he was secretary of state, being secretary of war in 1814–15. In 1816 the Democratic-Republican party elected him to the presidency of the U. S. In 1820 he was re-elected, only one vote being cast against him. This he owed chiefly to his having procured the cession of Florida by Spain, and to the settlement of the vexed question of the extension of slavery by the Missouri Compromise (which see). Mexico and the emancipated states of South America were formally recognized by the American government during Monroe's second term; but its chief event was the promulgation of the "Monroe doctrine" (which see). Pl. 22, Vol. III.

Monroe Doctrine, The, broadly stated, the doctrine of non-interference of European powers in the political affairs of the nations of the American continent. More specifically, the sentiment advanced by President Monroe, that the U. S. government is opposed to any extension of monarchical institutions on the North or South American continent. The oc-

casion of the utterance of this sentiment was the recognition in 1822, of the independence of Mexico, together with that of the provinces in South America which had previously belonged to Spain, there being at the time a suspected concert of the powers in the Holy Alliance to interference in Spanish America in behalf of Spain. President Monroe in his message of Dec. 2, 1823, declared "that the American continents are henceforth not to be considered as subjects for future colonization by any European power. With the existing colonies or dependencies of any European power we have not interfered, and shall not interfere. But with the governments which have declared their independence and maintained it, and whose independence we have acknowledged, we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition toward the U. S."

This doctrine has been variously interpreted, especially with regard to the relations of the U. S. government with Spain in reference to Cuba. The late distinguished Senator Stephen A. Douglas took strong ground in favor of what he denominated the doctrine of "manifest destiny," namely, that Cuba was eventually inevitably destined to become a part of the American system of states; and the late Secretary Blaine took a similar position. Mr. Seward, during the period of his premiership, was the first prominent American statesman to give an interpretation to the Monroe doctrine adverse to the idea of our government acting in the capacity of a protectorate over the destinies of American or Central or South American republics. Notwithstanding, however, the precedent set by him with regard to the Maximilian usurpation in Mexico, the general sentiment of the people of the U. S., as expressed by all parties in their conventions, and on several occasions by state legislatures and the two houses of Congress in the form of resolutions may be stated to have been in favor of asserting the inspiring principle of the Monroe doctrine in the late war for independence in Cuba; not in the shape of actual armed interference in the conflict, but in the way of such suggestive humane steps as Congress had already taken to ameliorate the condition of affairs in the island.

Monro'via, a seaport of West Africa, the capital of the state of Liberia, founded in 1824, and named after President Monroe. Pop. 1901, 5,000.

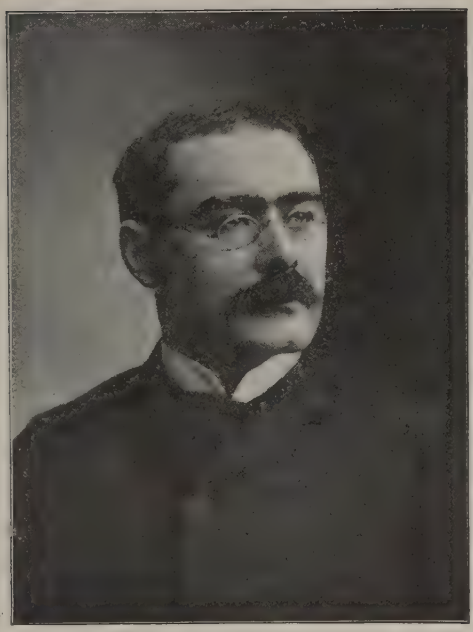
Mons (mons) (Flemish, *Bergen*), a fortified town of Belgium, capital of the province of Hainaut, 27 mi. e.s.e. of Tournay, on the Trouille, here crossed by four bridges. It was until 1862 one of the strongest fortresses of Europe, but the fortifications were then demolished and their site occupied by a fine boulevard. The principal buildings are the late Gothic church of St. Waltrude (Ste. Waudru), built in 1450–1589; the late Gothic townhal' dating from the middle of the fifteenth century; and the Renaissance belfry (1662), belonging to the old palace, which is now a lunatic asylum. The manufactures consist of linen, woolen, and cotton fabrics, firearms, cutlery, soap, etc. Coal is extensively mined in the vicinity. In 804 Mons, which occupies the site of one of Cæsar's forts, was made the capital of Hainaut by Charlemagne. It has figured much in history. Pop. 25,187.

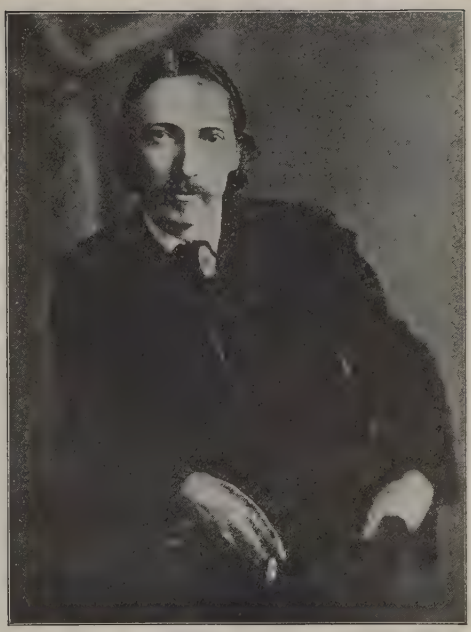
Monseigneur (mon-sān-*yeur*) (abbreviated *Mgr.*, pl. *Messeigneurs*), a title of dignity in France. Under Louis XIV the dauphin was styled *monseigneur*, without any addition. Princes, dukes and peers, archbishops, bishops (who adopted the title at the close of the seventeenth century), cardinals, marshals of France, presidents of parliament, etc., were addressed by this title.

Monsieur (mo-syeu) (abbreviated *M.*; plural *Messieurs*, abbreviated *MM.*), used without any addition, formerly in France designated the king's eldest brother, though, in addressing him, the title *Monseigneur* was used. The last prince so called was the Comte d'Artois, brother of Louis XVIII. In common use it answers both to the English *sir* and *Mr.*, and is also used before titles.

Mon'soon, the name given to a certain modification or disturbance of the regular course of the trade winds which takes place in the Arabian and Indian seas. Between the parallels of 10° and 30° south latitude the eastern trade winds blow regularly, but from the former parallel northward the course is reversed for half the year, and from April to October the wind blows constantly from the southwest. During the other six months of the year the regular northeast trade wind prevails. These two alternating winds are the monsoons proper, but the name is now commonly given to similar alternating winds in any region.

Monster (or Monstrosity), a term applied in anatomy and physiology to living beings which exhibit from birth onward some important abnormal features in structure, or present notable deviations from the normal type of their kind. The science which investigates such normal forms is known as *teratology*. Monsters present very wide variations in the characters and degrees of the malformations, ranging from an almost imperceptible to an almost total deviation from the normal type. But there are definite types of monstrosities, distinguished by distinct anatomical characters, just as there are definite types of normal structure; and the former may be classified by considering the fœtus or embryo. The anatomist may at once detect all fictitious cases of monstrosities by noting that they present characters perfectly incompatible with any known type of abnormal development. Teratology can explain most, if not all malformations, as results of abnormal growth or disease. These so-called "*freaks* of nature" are in truth the results of morbid actions and operations in the living organism, as well defined, but not yet so well known, as are those of the healthy and normal body. Among the prominent or





ENGLISH AND AMERICAN WRITERS

Rudyard Kipling
Eugene Field

Robert Louis Stevenson
James Whitcomb Riley

Plate 24, Vol. III

primary causes in the production of monstrosities in the human embryo are the following: Deficiencies or deformations in the reproductive organs and materials of the father or mother, or of both parents; diseases or malpositions of the placenta or afterbirth, or of the fœtal membranes; retardation in the development of the fœtus itself, arising from pressure, injuries, or actual disease either originating from the germ itself or communicated from the mother; and in the presence of actual or potential disease in either or both parents. Injuries to the mother may also to some extent affect the embryo, though most authorities are doubtful on the point. Malformations and monstrosities are frequently met with in the lower animals, and particularly in those which are domesticated by man. In the plant world monstrosities also occur.

Montagnards (moṇ-tàn-yär) (or La Montagne), "the Mountain," a popular name in French history, given to the extreme democratic party in the convention, because they occupied the higher rows of benches in the hall where it met. The chiefs of "the Mountain" were Danton, Marat, and Robespierre, the men who introduced the "Reign of Terror." The mountain rose to the height of its power in June, 1793, and for more than a year it was sufficiently formidable to stifle all opposition. Soon after the fall of Robespierre (July 28, 1794) the names of "Montagnard" and "Montagne" gradually disappeared from party nomenclature. A futile attempt was made by the extreme party in the National Assembly, after the revolution of 1848, to revive the title of "Mountain."

Mon'tagu, Lady Mary Wortley (1689–1762), famous for her brilliant letters. She was the eldest daughter of Evelyn Pierrepont, afterward duke of Kingston. In 1712 she made a runaway match with Mr. Edward Wortley Montagu, a wealthy Whig scholar, who quarreled with her father. On the accession of George I in 1714 Mr. Montagu obtained an official position in London, and Lady Mary emerged from the rural seclusion in which she had hitherto spent her life. Her beauty and elegance and her wit and vivacity rapidly gained her admiration and influence, and she became familiarly acquainted with Addison, Congreve, Pope, and other distinguished writers. In 1716 Mr. Montagu was appointed ambassador to the Porte, and Lady Mary accompanied him to Constantinople, where they remained from January, 1717, to May, 1718. It was during this period that Lady Mary's famous *Turkish Letters* were written. These letters are marked by great vivacity and graphic power, together with keen observation and independent judgment. Lady Mary has another claim to remembrance in her courageous adoption of the Turkish practise of inoculation for smallpox, and for her energy in promoting its introduction into England.

Montaigne (mon-tān'; Fr. pron. moṇ-teny), Michel Eyquem de (1533–1592), the famous French essayist, was b. at the castle of Montaigne, in Périgord. He was a parliamentary counselor from 1554–1567; he married the daughter of a fellow counselor; and at some period was appointed a gentleman of the chamber to the king. In 1571, however, he retired to his ancestral château, and devoted himself to peaceful study and meditation. In 1580 he published the first two books of his *Essais*, and immediately afterward set out on a journey through Germany, Switzerland and Italy, to restore his health, which had been shattered by the attacks of a hereditary disease. In 1588 he republished his *Essais*, with the addition of a third book. After a last visit to Paris (in the course of which he was thrown into the Bastile for a short time by the Leaguers) Montaigne seems to have dwelt quietly in his château. Montaigne's *Essais* have at all times been one of the most popular books in the French language. They embrace an extraordinary variety of topics, which are touched upon in a lively, entertaining manner, with all the raciness of strong, native good sense, careless of system or regularity. Sentences and anecdotes from the ancients are interspersed, with his own remarks and opinions, and with stories of himself in a pleasant strain of egotism, and with an occasional license, to which severer moralists can with some difficulty reconcile themselves. There are two English translations of the *Essais*, one by Charles Cotton, and an earlier one by John Florio.

Montalambert (moṇ-tà-làṇ-bār), Charles Forbes René, Comte de (1810–70), French publicist, politician, historian, and theologian, b. in London. His father was a French emigré, afterward a peer of France under the Restoration; his mother was English. In 1835 he took his seat in the chamber of peers, and his eloquence, sincerity, and ability soon made him one of the most influential orators in the chamber. After the revolution of 1848 he was elected a member of the National Assembly. He was at first inclined to support Napoleon III, but was soon alienated by the policy of that emperor. Failing to be elected in 1857 he spent the remainder of his life in writing and traveling. Montalambert was an ardent lover of liberty, and yet a firm believer in aristocracy and ultramontanism. Of his very numerous writings the chief is his *Monks of the West—Les Moines d'Occident depuis St. Benoît jusqu'à St. Bernard* (Eng. transl. 1861–68).

Montana, one of the northwestern states of the Union, is bounded on the n. by the Canadian provinces of Alberta and Assiniboia; on the e. by North and South Dakota; on the s. by Wyoming and Idaho, and on the w. by Idaho. Its approximate area is 146,000 sq. mi. Montana may be separated into two great divisions, that of the plains, comprising the eastern two thirds, and that of the mountains, comprising the western portion. The headwaters of two of the largest rivers of North America, the Columbia and Missouri, have their sources in Montana. The mean elevation of the state is about 3,000 ft.; the average height of the Rocky Mountains, whose sides are covered with dense forests of pine, fir, and cedar, is about 6,000 ft., while the highest

peaks rise to 12,000 ft. The Yellowstone National Park forms part of the southern boundary of the state. In the southeast the Bad Lands extend into the state from Wyoming.

Climate.—The climate of Montana is more moderate than that of the Dakotas and Minnesota, since the warm westerly winds prevail more than the north winds in winter here; there are but few excessively cold days, and, as there is little moisture in the air, the winters are less chilly, and more exhilarating than in the East. The atmosphere is remarkable for its clearness, and cyclones are unknown. The mean temperature at Fort Assiniboin is 38°. The rainfall is not sufficient for the needs of agriculture.

Vegetation.—The plains are treeless; the mountain valleys about the heads of the Missouri are clothed with grass and artemisia, in many localities extending to a considerable height up the mountains, which are themselves timbered, though not heavily. In the northwestern part, where the rainfall is somewhat greater, the forests become of importance. The mountains are forest-clad from summit to base; and the narrower valleys are also covered, while the timber is of larger size and of much greater commercial value than elsewhere in the state, the valuable timber consisting of pine, fir, cedar, willow, aspen, cottonwood, etc. The soil contains all that is needed for sustaining vegetation, but it is almost valueless without irrigation; with that, however, the yield of grains and vegetables is enormous. A large part of the population has turned its attention to stock raising, for which the state is better suited than for agriculture.

Mining.—Montana is rich in minerals, the principal ones being gold, silver, copper and lead. The value of these four metals in 1902 exceeded $40,000,000 and Montana is now the largest copper-producing state in the Union. Its minerals first attracted immigration, and have been her principal source of wealth.

Manufactures.—Growth in manufacturing has been rather slow, mining, grazing, farming and railroad extension having had almost exclusive attention. Lumber mills and flour and gristmills have been of chief importance, after quartz mills, reduction furnaces and ranches. In 1900, the value of manufactures in this state was $57,075,824.

Transportation.—The principal railroads are the Northern Pacific and the Great Northern. There are 29 railroads in all with a total mileage of 2,988. The extension of the Gt. Northern opened up to settlement the Flathead country.

Education.—A permanent school fund is provided from the sale of school lands, two sections to every township, and five per cent. of the net proceeds from the sale of public lands retained by the United States before the territory became a state. Ample provision is also made for sustaining higher educational institutions. The State University is located at Missoula, the Agricultural College at Bozeman, the State School of Mines at Butte and the State Normal School at Dillon.

History.—That part of Montana which lies east of the Rocky mountains was included in the Louisiana Purchase; the rest was formerly contained in Oregon and Washington. This territory was first visited by the French in 1742, and later by Jesuit missionaries, fur traders and trappers. In 1861, gold was discovered, and the following year mining began in earnest. The territory was organized in 1864, and in 1889 Montana was admitted into the Union. The population is composed of industrious and enterprising people. Principal cities: Helena, the capital, population in 1900, 10,770; Butte, 30,470; Great Falls, 14,930; Anaconda, 9,453. Pop. 1900, 243,229; Indians, 11,343.

Mont Blanc (that is "White Mountain"), the loftiest mountain of Europe, belonging to the Pennine chain of the Alps, and rising 15,781 ft. above the sea level, is situated on the frontiers of France and Italy, and near that of Switzerland. The main portion of the mountain and the highest summit are in France (Haute Savoie). The huge mountain mass (30 mi. long by 10 mi. wide) is almost entirely granitic. It has numerous summits, some rounded, some sharp. On the southeast its face is steep; on the northwest lateral chains are sent off, among which about thirty glaciers are counted. The chief are the glaciers Des Bossons, Bois, Argentière, and Mer de Glace. The summit was first reached in June, 1786, by the guide Jacques Balmat.

Montcalm (moṇ-käm), Louis Joseph Saint Veran, Marquis de (1712–1759), French general. Having entered the army, he distinguished himself in several campaigns in Europe, and in 1756 was appointed to the chief command of the French troops in Canada. Here he took Fort Ontario (Oswego) and Fort William Henry (on Lake George), and occupied Ticonderoga (1758); but at Quebec in 1759 was completely defeated by General Wolfe on the Heights of Abraham, both commanders being mortally wounded.

Mont-de-Piété (moṇ-dē-pē-ā-tā) (in Italian *Monte di Pietà*), a name for banks of charity which lend money on pledges at a low rate of interest, and whose aim is purely philanthropic. These institutions were established to prevent the scandal and abuse of usury, and exist in Italy, France, the Netherlands, Spain, etc. They are similar to our pawn shops.

Monte Cristo, a small island 6 mi. in circumference belonging to Italy, 25 mi. s. of Elba, the seat of a penal colony. Dumas has given the name of this isle to the hero of one of his most popular romances.

Montecu'culi (or, more correctly, Montecu'coli), Raimondo (1608–1680), prince of the Empire, and duke of Melfi, military commander, b. near Modena. He entered the Austrian service, and served during the Thirty Years' War with great distinction. In 1664 he gained a great victory over the Turks after having driven them out of Transylvania. In 1673 he was placed at the head of the imperial troops, and checked the progress of Louis XIV, Montecuculi's subsequent advance into Alsace was repulsed by the Prince of Condé. His

last military exploit was the siege of Philipsburg.

Montefiore (mon-te-fi-ō′rā), Sir Moses (1784–1885), Jewish philanthropist and centenarian. In 1837 he was chosen sheriff of London, the same year he was knighted, and in 1846 he was made a baronet. His benevolence to Jews throughout the world was unbounded; and he visited Palestine seven times, the last when in his 92d year. Pl. 27, Vol. III.

Montene′gro (meaning Black Mountain), an independent principality in Europe, in the northwest of Turkey, bounded by Herzegovina, Albania, the Adriatic, and Dalmatia. Area about 3,630 sq. mi. The surface is everywhere mountainous, being covered by an extension of the Dinaric Alps, rising to the height of 8,850 ft. There are, however, a few beautiful and verdant plains and valleys, in which the soil is tolerably fertile. The principal river is the Moratcha. About half of the Lake of Scutari, besides several smaller lakes, lies within the Montenegrin boundary. The climate is healthy. Forests of beech, pine, chestnuts, and other valuable timber, cover many of the mountain sides. Fruit trees of all kinds abound, especially in the sheltered valleys, where even almonds, vines, and pomegranates ripen. Agriculture is in a very rude and inefficient state, though every cultivable piece of land is planted with Indian corn, potatoes, tobacco, rye, wheat, cabbages, or some other useful plant. Sheep, cattle, and goats are reared in great numbers. Manufactures, with exception of a coarse woolen stuff, are unknown. The chief occupations of the Montenegrins are agriculture and fishing, trade being altogether left to foreigners. The exports are sheep and cattle, mutton hams, sumach, honey, hides, cheese, butter, and other agricultural produce. The chief towns (in reality little more than villages) are Cettinje (2,000 inhabitants), the capital; Podgoritza (4,000 inhabitants); Niksich; and the seaports Dulcigno and Antivari. The Montenegrins are pure Serbs and speak a Serbian dialect. They are generally of tall stature and well proportioned. The men go at all times fully armed, whatever be the occupation in which they are engaged, and all between 14 and 50 years of age (estimated at 29,000) are liable to military service. In religion they are of the Greek Church. Education, once neglected, is now free and compulsory. Montenegro is nominally a constitutional monarchy, with a state council of eight members, but the prince is practically absolute. The revenue is estimated at $300,000. Pop. 1901, 250,000.

The history of Montenegro for many years is a record of deadly struggles with the Turks, and of a slow-growing civilization among its inhabitants. In 1852 Danilo I became vladika, but in 1855 he married, threw off his ecclesiastical character, assuming the title of hospodar or prince, and transformed his land into a secular principality, the independence of which was soon recognized by Russia. Danilo was assassinated in 1860, and the present prince, Nicolas I, Petrovitch, became hospodar. In 1861–62 he engaged in a not altogether successful war against Turkey; but in 1876 he joined Servia and in 1877–78 Russia, against his hereditary foe, and 1,900 sq. mi. were added to his territory by the Treaty of Berlin.

Monterey (mon-te-rā′i), capital of the state of New Leon, in Mexico, about 100 mi. from the Texas frontier. Monterey, which is said to be the most Americanized town in Mexico, has a considerable transit trade. In 1846 it was captured by the U. S. troops under General Taylor. Pop. about 16,000.

Montespan (mon̦-tes-pän̦), Françoise Athenais Marchioness de (1641–1707), mistress of Louis XIV, was the second daughter of the Duke of Mortemart, and was, in 1663, married to the Marquis de Montespan. To the most fascinating beauty she added a natural liveliness and wit, and a highly cultivated mind. Soon after her appearance at court she attracted the king's attention, and from 1668 till 1674 she shared his favor with Mlle. de la Vallière. The influence of the favorite mistress was often exercised in public affairs, and her empire over the king continued until about 1679, when a growing attachment to Mme. de Maintenon finally estranged his affections from Mme. de Montespan.

Montesquieu (mon-tes-ke*u*), Charles Louis de Secondat, Baron de la Brede et de, (1689–1755), b. near Bordeaux. He studied law; in 1714 became a counsellor of the Parliament of Bordeaux; and in 1716, on the death of his uncle, parliamentary president and Baron de Montesquieu. The *Lettres Persanes*, the first of the three great works on which his fame principally rests, appeared in 1721. Purporting to consist of the correspondence of two Persians traveling in France, this book is a lively satire upon the manners and customs, and the political and ecclesiastical institutions of the author's age and country. In 1728 Montesquieu was admitted to the French academy. In 1748 *L'Esprit des Lois*, the result of twenty years of labor, was published, and at once placed its author among the greatest writers of his country. The scope of the work is perhaps best indicated by the sub-title of the original edition, which describes it as a treatise on the relation which ought to exist between the laws and the constitution, manners, climate, religion, commerce, etc., of each country.

Montevid′eo, capital of Uruguay, is situated on a small peninsula on the north coast of the estuary of the La Plata, 130 mi. e.s.e. of Buenos Ayres. Montevideo is one of the best built towns in South America, and enjoys one of the finest climates. The principal buildings are the cathedral, the townhouse, the Solis opera house, the customhouse, exchange, etc. There is a university with sixty professors and nearly seven hundred students. The commercial development of Montevideo, considerable as it is, has been much retarded by the shallowness of its long-neglected harbor. A company is now engaged in excavating a port to admit vessels of 25 ft. draught. Extensive dry docks have also been recently constructed. The chief exports are wool, hides, tallow, dried beef, and extracts of flesh. The chief imports

are cottons, woolens, hardware, and other manufactured articles. Montevideo sends out above half the whole exports of Uruguay, and receives all but a small fraction of the imports. Pop. 134,346, one third of whom are foreigners.

Montezu'ma, Aztec emperor of Mexico when Cortez invaded the country in 1519. Influenced by an ancient prophecy, he at first welcomed the Spaniards; but when he discovered that they were no supernatural beings, he secretly took measures for their destruction. Cortez on learning this seized Montezuma, and compelled him to recognize the supremacy of Spain. The Aztecs immediately rose in revolt, and refused to be quieted by the appearance of Montezuma. While urging them to submission he was struck on the temple with a stone and fell to the ground. Cut to the heart by his humiliation, he refused all nourishment, tore off his bandages, and soon after expired.

Montfort, Simon de (about 1200–1265), Earl of Leicester, famous in the constitutional history of England, was b. in France. He was the youngest son of Simon de Montfort, earl of Leicester, the "scourge of the Albigenses." He won the favor of Henry III, and married Eleanor, countess dowager of Pembroke, and sister of the king. He was conspicuous among those who extorted the Provisions of Oxford from the king in the "Mad Parliament" in 1258; and he was the leader of the barons in the so-called "Barons' War" that followed. In 1264 he agreed to submit the question of the king's right to repudiate the Provisions to Louis XI of France; but when the latter by the Mise of Amiens, decided in favor of Henry, De Montfort refused to be bound by the decision. Both sides took up arms, and at the battle of Lewes (May 14, 1264) the king was defeated and taken prisoner. The Mise of Lewes, to which Henry III agreed, contained the outlines of a new constitution, in which the principle of representative government was recognized. The king accepted the constitution on Feb. 14, 1265; but Prince Edward and the Mortimers raised the standard of revolt. At the battle of Evesham (Aug. 4, 1265) De Montfort was defeated and slain. His memory was long revered by the people as a martyr for the popular liberty.

Montgolfier, Joseph Michel (1740–1810), and Jacques Étienne (1745–1799), joint inventors of the balloon, were b. at Vidalon-lès-Annonay, in the department of Ardéche, in France. Their first balloon, inflated with rarefied atmospheric air, ascended from Annonay in 1782, and the invention soon brought them fame and honors. Joseph was also the inventor of the water ram.

Montgom'ery (or Montgomeryshire), an inland county in North Wales, has an area of 495,082 acres, consisting mostly of wild, rugged, and sterile mountains, varying from 1,000 to 2,000 ft. in height. It contains, however, some fine and fertile valleys, the most extensive and fruitful of which is that of the Severn, the principal river. Wheat and oats are the principal crops. It is the chief seat of the Welsh flannel manufactures. Montgomery is the county town, but the largest town is Welshpool. Pop. 58,003.

Montgomery, county seat of Montgomery co., Ala., and state capital; 180 m. n. e. of Mobile; on the Alabama river and on the L. & N., the Cent. of Ga., the Ala. Mid., the Savannah, Amer. & Mont. and the W. of Ala. railroads. It has steamer communication with Mobile the year round. Extensive deposits of coal and iron are within easy reach by rail and water, and the heart of the yellow pine and hard-wood region is reached by a narrow-gauge railroad. The city is an important cotton market and trade center. Other industries are brickyards, flour mills, carriage and wagon works, foundries and machine shops, car works and candy factories. The capitol building has a commanding situation overlooking the city. Montgomery is the seat of a state normal school (colored), a U. S. government building, an orphanage and a home for widows. It is the second city of the state in size and commercial importance. Pop. 1900, 30,346.

Montgomery, Richard (1736–1775), American general, was b. in Ireland. After serving with credit in the English army, he emigrated to N. Y. and in 1775 was delegate to the First Provincial Congress. In an expedition to Canada was second in command, and succeeded in capturing Montreal.

Month, a period of time derived from the motion of the moon; generally one of the 12 parts of the calendar year. The calendar months have from 28 to 31 days each, February having 28, April, June, September, and November 30, the rest 31. Month originally meant the time of one revolution of the moon, but as that may be determined in reference to several celestial objects there are several lunar periods known by distinctive names. Thus the *anomalistic month* is a revolution of the moon from perigee to perigee, average 27 days 13 hrs. 18 min. 37.4 sec.; the *sidereal month*, the interval between two successive conjunctions of the moon with the same fixed star, average 27 days 7 hrs. 43 min. 11.5 sec.; the *synodical*, or *proper lunar month*, the time that elapses between new moon and new moon, average 29 days 12 hrs. 44 min. 2.9 sec. The *solar month* is the twelfth part of one solar year, or 30 days 10 hrs. 29 min. 5 sec.

Montmoren'cy, a small river of Canada, which rises in Snow Lake, prov. of Quebec, flows south, and joins the St. Lawrence 8 mi. below Quebec. Near its mouth are the Falls of Montmorency, which have a breadth of about 50 ft., and a perpendicular descent of 242 ft.

Montmorency (mon-mo-rän-si), the name of a noble family of France and the Netherlands, derived from the village of Montmorency near Paris. One of its most distinguished members was Anne de Montmorency, first duke of Montmorency (1492–1567), constable of France, a distinguished general. He distinguished himself at the battle of Marignano in 1515, and for his valor at Bicocca in 1552 was made marshal. Francis I conferred on him

the dignity of Constable in 1538. In 1557 he lost the battle of St. Quentin against Philip II of Spain, and was taken prisoner, but he regained his freedom by the Peace of Cateau-Cambrésis in 1559. Under Charles IX he joined the Duke of Guise and Marshal St. André in forming the famous triumvirate against Condé and the Huguenots. At the battle of Dreux in 1562 Montmorency was made prisoner by the Huguenots; on the renewal of the civil war he gained a decisive victory over them at St. Denis, Nov. 10, 1567, though the following day he died of his wounds.

Montpelier, Washington co., Vt., state capital, 40 mi. s.e. of Burlington. Railroads: Central Vermont; and Montpelier & Wells River. It is in the center of a farming district. Manufactures include flour, leather, lumber, machinery, granite, etc. Pop. 1900, 6,266.

Montpellier (moṇ-pel-yā), chief town of the department of Hérault, in France. It is one of the handsomest towns of the south of France. Since the twelfth century it has been famous for its school of medicine, said to have been founded by Arab physicians driven out of Spain. The botanical garden, begun under Henry VI, is the oldest in France. Montpellier manufactures cottons, candles, soap, verdigris, chemicals, etc. It carries on an active trade, Cette serving as its harbor. Montpellier was a stronghold of the Huguenots, and suffered much in the religious wars. The edict of Montpellier (Oct. 20, 1622) granted the free exercise of their religion to Protestants, and confirmed the Edict of Nantes. Pop. 45,930.

Montreal, the largest city and the commercial capital of the Dominion of Canada, is situated on an island of the same name, formed by the mouths of the Ottawa, where, after a course of 750 mi. it debouches into the St. Lawrence. It is built upon the left or northern bank of the St. Lawrence, and is situated 180 mi. s.w. of Quebec. Behind the town rises the Mount Royal (Mont Real), from which it derives its name, and which is reserved as a public park. Situated at the junction of the inland and the ocean navigation, it has a harbor with three miles of wharfage accessible to steamers of the deepest draught. There are numerous lines of steamships which have their Canadian headquarters at Montreal. It is also the chief terminus of the Grand Trunk Railway, and the eastern terminus of the Canadian Pacific Railway. The city, which is one of the most attractive in Canada, contains many handsome public buildings; and is divided into distinctly marked English and French quarters. The chief public buildings are the courthouse, Bonsecours Market, customhouse, city hall, etc.; and the principal churches are St. Peter's Cathedral, constructed on the model of St. Peter's at Rome, and the church of Notre Dame (large enough to accommodate 10,000 persons). The exports are chiefly the products of the country, such as grain, flour, cheese, lumber, etc., and there is a large trade in furs. The principal imports are cottons, woolens, and silks, iron and hardware, and tea and sugar. Among the industrial establishments of Montreal are iron foundries, distilleries, breweries, sugar refineries, soap and candle works; and there are manufactures of cotton, silk, boots and shoes, paper, carpets, tobacco, hardware, edge tools, floor cloth, carriages, etc. The Grand Trunk Railway, which connects the railways of Canada with those of the U. S., crosses the St. Lawrence at Montreal by the Victoria Bridge, 9,184 ft. in length, constructed in 1854–59. Montreal was founded, under the name of Villemarie, in 1642, on the site of the Algonquin village, Hochelaga. It came into the hands of the English in 1760, when it was taken from the French by General Amherst. It was the seat of government of Lower Canada until 1849, in which year it was superseded by Quebec. Montreal returns three members to the Canadian House of Commons, and three also to the provincial legislature. Pop. 1901, 266,826.

Montreal, an island of Canada, in the river St. Lawrence, at the confluence of Ottawa River, 32 mi. long, and 10½ broad, containing the city of Montreal. The surface is generally level (with the exception of Mount Royal), and soil is for the most part fertile and well cultivated.

Montrose, James Graham, Marquis of (1612–1650), son of the fourth earl of Montrose, was b. at Montrose. In 1639 he was one of the leaders who were appointed to confer with Charles I, after which he went over to the royalist side, was created a marquis, and made commander of the royal forces in Scotland. With an army partly composed of Irish and Highlanders he gained in rapid succession the battles of Tippermuir and Bridge of Dee (1644), Inverlochy, Auldearn, Alford, and Kilsyth (1645). In March, 1650, he landed in Orkney with a small body of followers. He failed, however, in raising an army, and a few months later was hanged.

Montserrat, one of the British West Indies, belonging to the Leeward group, with an area of 32 sq. m , mostly mountainous and barren. Its only town is Plymouth. Pop. 10,083.

Moody, Dwight L., evangelist, was b. in Northfield, Mass., in 1837. At the age of 19 he engaged in missionary work. In 1873, accompanied by Sankey, visiting Europe, his services resulted in great religious awakenings. In 1879 he opened a seminary for girls at Northfield, Mass., and in 1881 a seminary for boys, also a summer school in 1890. D. Dec. 12, 1899.

Moody, William Henry (1853-), an American statesman, educated at Harvard University. Hs was admitted to the bar in Massachusetts, and in 1890 became attorney for the Eastern District of that state. He was a member of the 54th Congress to fill a vacancy, and also a member of the 55th, 56th and 57th congresses. In 1902 he was appointed Secretary of the Navy, and in 1904 succeeded Philander C. Knox as Attorney-General.

Moon, The, one of the secondary planets and the satellite of the earth, revolves round the latter in an elliptic (almost circular) orbit, in one sidereal month, at a mean distance of 238,818 mi., her greatest and least distances being

252,948 and 221,593 mi. Her mean diameter is 2,159 mi. Her surface is about $\frac{1}{13}$ (14,600,000 sq. mi.) of that of the earth; her volume $\frac{1}{49}$; her mass about $\frac{1}{81}$; and her mean density a little more than $\frac{1}{2}$. A mass weighing 1 lb. on the

Comparative Sizes of the Earth and Moon.

earth's surface would weigh about 2.64 ozs. on the moon's surface. For every revolution in her orbit, the moon rotates once on her axis, so that the same portion of her surface is constantly turned toward the earth; but in virtue of an apparent oscillatory motion, known as libration, about $\frac{4}{7}$ of her surface is presented at one time or another to terrestrial observers. If

The Moon, first quarter. From Photograph through the Lick Telescope, by Prof. S. W. Burnham.

the moon's orbit were in the plane of the ecliptic, solar and lunar eclipses would occur monthly. Her orbit is, however, inclined 5° 8′ 48″ to the ecliptic, so that her meridian altitude has a range of 57°, and she occults in course of time every star within 5° 24′ 30″ of the ecliptic. An eclipse of the moon occurs when she passes into the earth's shadow; when she prevents the sun being seen, there is an eclipse of the sun. The changes in the appearance of the moon, described by the words waxing and waning, are known as *phases*. The four chief phases, occurring at intervals of 90° in the lunar orbit, are New Moon, when she is between the earth and sun (i. e., in conjunction with the sun), and so turns an unilluminated side to the earth; First Quarter, when one half of her illuminated disc (i. e., one quarter of the entire lunar surface) is visible; Full Moon, when her whole illuminated disc is presented to the earth; and Last Quarter, when once more only half of her disc is visibly illuminated. Between new moon and full moon the moon is said to *wax;* on the rest of her course she *wanes.* On the visible portion of the lunar surface there is either no atmosphere or an exceedingly rare one, and no traces of organic life have been observed. As each portion is alternately in sunlight and in shade for a fortnight at a time, and as no atmosphere has been detected, it is conjectured that the lunar extremes of heat and cold far exceed the greatest terrestrial extremes. The surface of the moon is mainly occupied by mountains, most of which are named after eminent scientific men. They are sometimes detached, as precipitous peaks, more frequently they form vast continuous ranges, but the most prevalent form is that of crater mountains, sometimes 8 to 10 mi. in diameter, and giving evident traces of volcanic action. Certain crater-like formations, which have still greater diameters, are generally spoken of as, "walled plains." Larger still are the "gray plains," which were at one time taken for seas, before the absence of water from the lunar surface was demonstrated. They may possibly be the floors of old seas. Some of the mountains have been estimated to be over 24,000 ft. in height, from observation of their shadows. Very peculiar ridges of comparatively small elevation extend for great distances, connecting different ranges or craters. The so-called "rilles" or "clefts" are huge, straight furrows of great length (18 to 90 mi.), now generally believed to be caused by cracks in a shrinking surface. There are also valleys of various sizes, and "faults" or closed cracks, sometimes of considerable length. In reading descriptions of the visible peculiarities of the moon, it should be remembered that the highest telescopic power yet applied to that planet is only equivalent to bringing it within about 40 mi. of the naked eye.

Moore Sir John (1761–1809), a celebrated British general, was b. at Glasgow, killed at Corunna. Having obtained an ensign's commission in the Fifty-first Regiment, he served at Minorca, in the American War, as brigadier general in the West Indies (1795), in Ireland

during the rebellion of 1798, in Holland in 1799, and in Egypt in 1801, where he was severely wounded in the battle which cost Sir Ralph Abercrombie his life. Moore was now regarded as the greatest living British general, and in 1805 he was knighted. In 1808 he was appointed commander in chief of the British army in Portugal to operate against Napoleon. He advanced to Salamanca in spite of the gravest difficulties, but was finally compelled to retreat to Corunna, a distance of 200 mi., in face of a superior force.

Moore, THOMAS (1779–1852), the national poet of Ireland, was b. in Dublin, d. near Devizes. From Trinity College, Dublin, he passed in 1799 to the Middle Temple in London, nominally to study law; but he almost immediately formed a connection with the fashionable and literary society of which he was so long an ornament, and in 1800 he was permitted to dedicate his *Translation of the Odes of Anacreon* to the Prince of Wales. His next venture, the *Poetical Works of the Late Thomas Little*, though partly written in a licentious vein, which he afterward regretted, increased his reputation; and in 1803 Lord Moira obtained for him the office of registrar of the admiralty court at Bermuda. Moore went out, but almost immediately appointed a deputy, and returned to England via the U. S. and Canada, and in 1806 published his *Odes and Epistles*. Both Jeffrey and Byron were among the warmest friends of Moore. In 1807 Moore agreed to write words for a number of Irish national airs, arranged by Sir John Stevenson. In these *Irish Melodies*, which were not finished till 1834, he found the work for which his genius was peculiarly fitted, and it is on them that his poetic reputation will mainly rest. His most ambitious work, the gorgeous Eastern romance of *Lalla Rookh*, was published in 1817, and brought its author $15,000. The *Life of Sheridan* was produced in 1825, and *The Epicurean*, a prose romance, in 1827. Next came the *Life of Lord Byron*, for which he received nearly $25,000, and the *Life of Lord Edward Fitzgerald*. His remaining works include *The Summer Fête*, a poem; *Travels of an Irish Gentleman in Search of a Religion*, a serious apology for Roman Catholicism; and (in 1834) a *History of Ireland for Lardner's Cyclopædia*, an uncongenial task work, never finished.

Moorish Architecture is that form of Saracenic architecture which was developed by the Moslem conquerors of Spain in building their mosques and palaces. Its main characteristics are—the horseshoe arch, varied by the trefoil, cinquefoil, and other forms of arch; profuse decoration of interiors by elaborately designed arabesques in low relief, enriched by colors and gilding, as well as by geometrical designs worked in mosaics of glazed tiles; the slenderness of the columns in proportion to the supported weight; and the curious stalactitic pendentives by which the transition is effected from the rectangular ground plan to the arched or domed roof. An important specimen of this style is the mosque of Cordova, now the cathedral, which was begun by Caliph Abd-el-Rahman (786 A.D.), completed by his son, and subsequently much altered. It consisted originally of eleven aisles, and the eight aisles which were afterward added (976–1001), made it one of the largest buildings in Europe, but the effect of its great extent, 420 ft. by 375, is marred by its height, which is only about 30 ft. to the roof. Another notable specimen of Moorish architecture is the Giralda or cathedral tower of Seville. It is supposed to have been built by Abú Yusúf Yakúb (1171 A.D.) as a tower of victory, and was used by the Moslems as a minaret or muezzin tower. The base is a square of about 50 ft., from which the tower rises straight for 185 ft., and is now crowned by a belfry, added in the sixteenth century. The lower part of this tower is nearly plain, but from about one third of its height upward it is enriched by sunk panels filled with ornamentation in relief, which give lightness and grace to the structure without affecting its general massiveness. The most characteristic Moorish palace in existence is the Alhambra in Granada, an immense structure of simple and rather forbidding exterior, but within gorgeous almost beyond description. See *Alhambra*. In this palace are found to perfection the distinctive characteristics of Moorish architecture.

Moors, a Mohammedan, Arabic-speaking race of mixed descent, forming part of the population of Barbary, and deriving their name from the Mauri, the ancient inhabitants of Mauritania, whose pure lineal descendants are, however, the Amazirgh, a branch of the Berbers. The modern Moors have sprung from a union of the ancient inhabitants of this region with their Arab conquerors, who appeared in the seventh century. As the Mohammedan conquerors of the Visigoths in Spain (711–713) came from North Africa, the name Moor was also applied to them by Spanish chroniclers, and in that connection is synonymous with *Arab* and *Saracen*. These Moors pushed northward into France, until their repulse by Charles Martel at the great battle of Tours in 732, after which they practically restricted themselves to Spain south of the Ebro and the Sierra Guadarrama. Here, for centuries, art, science, literature, and chivalry flourished among them, while the rest of Europe was still sunk in the gloom of the Dark Ages. Their internal dissensions and divisions, however, weakened them in face of the new Christian kingdoms of Aragon and Castile, and before the close of the thirteenth century their possessions were limited to the kingdom of Granada. This, too, was finally subdued by Ferdinand the Catholic in 1492; and while great numbers of the Moors emigrated to Africa, the remainder, under the name of *Moriscos*, assuming in great part a semblance of Christianity, submitted to the Spaniards. The cruel proselytizing zeal of Philip II, however, excited a sanguinary insurrection among the Moors in 1568–70, which was followed by the banishing of many thousands, while Philip III completed the work in 1610 by finally expelling

the last of these, the most ingenious and industrious of his subjects. Between 1492 and 1610 about 3,000,000 Moriscos are estimated to have left Spain. The expulsion of the Moors was one of the chief causes of the decadence of Spain; for both agriculture and industries fell into decay after their departure. The expelled Moors, settling in the north of Africa, founded cities from which to harass the Spanish coasts, and finally developed into the piratical states of Barbary, whose depredations were a source of irritation to the civilized Christian powers even till well into the present century.

Moradabad, a town of India, in Rohilkhand, in the Northwest Provinces, 75 mi. e. of Meerut, on the Ramganga. It is noted for its metal work, and is a center of local trade. It was founded by the Rohilla Afghans, and has a Protestant church and American mission, and a cantonment. Pop. 67,387. The district has an area of 2,281 sq. mi; pop. 1,155,173.

Morality (or Moral Play), a sort of allegorical play, embodying moral discourses in praise of virtue and condemnation of vice, the dialogue being carried on by personifications of virtues and abstract qualities. The Devil of the earlier Miracle Plays, which were never entirely superseded by the Moralities, became the Vice of the latter; sometimes he appears in person, with the Vice as his attendant. Moralities first appeared about the beginning of the reign of Henry VI, and lingered until the reign of Elizabeth (about 1600). Latterly they maintained their interest by reference to current topics, but finally gave way to regular drama.

Mora'va, the chief river of Moravia, a tributary of the Danube, which it joins after a course of about 200 mi.

Moravia, a northwestern province or crownland of the Austrian Empire, area 8,578 sq. mi. The minerals are of considerable importance, and include iron, coal, graphite, and slate. The chief crops are rye, oats, barley, potatoes, and flax. Fruit is very abundant, and large quantities of wine are annually produced. Sheep and cattle are reared. Moravia is the most important manufacturing province of the empire, after Austria proper and Bohemia. Its woolen industries are of world-wide fame, and linen and cotton, beet-root sugar, iron and steel goods, machinery, beer, and spirits are also turned out in large quantities. About 70 per cent. of the inhabitants are Slavonians and nearly 30 per cent. Germans; total pop. 2,153,407.

Moravian Brethren (also called United Brethren, Herrnhuter, and officially Unitas Fratrum), a Protestant sect or church which originally sprang up in Bohemia after the death of John Huss. They built the town of Herrnhut, in Saxony, still the headquarters of the church. The doctrines of the Brethren had hitherto been more in harmony with the Calvinistic than with the Lutheran form of Protestantism, but under the influence of Count Zinzendorf, who himself became a bishop, they attached themselves to the Lutheran Church. From Herrnhut the Moravian Church extended to other points in Germany, and to England and the U. S. (1735). The Moravian Brethren have always distinguished themselves as missionaries, and maintain stations in North and Central America, South Africa, Australia, and Thibet. They are distinguished for the Puritanical simplicity of their life and manners, and for their earnest, if somewhat narrow and austere, piety. Moravian schools deservedly enjoy a high reputation even among those who are not members of the community. The Moravian church is estimated to number about 115,000 adherents.

Morbihan (mor-bi-äṅ), a northwestern department of France, on the Bay of Biscay; area 2,624 sq. mi., of which less than half is arable. The northern part is hilly, but the rest is low and level, especially along the coast, which is lined by several fertile islands and is deeply indented. The plains on the coast are fertile, and the ordinary fruits are abundant; cider, butter, and honey are among the chief products. The fisheries are important, and the general trade, favored by the harbors on the coast, and by canals, is considerable. Iron is the chief mineral. The chief town is Vannes. Pop. 544,470.

Mordvins, a race of people inhabiting European Russia, and belonging to the Bulgaric or Volgaic group of the Finnish family of peoples. They are found chiefly in the governments of Penza, Simbirsk, Saratov, Samara, Nishegorod, and Tambov. Their chief sources of livelihood are cattle rearing, hunting, fishing, and bee-keeping. Their numbers are estimated at 480,000.

More, Sir Thomas (1480–1535), a chancellor of England, b. in London. About 1502 he became a member of Parliament, and immediately made for himself a place in history by upholding the privileges of the House of Commons to treat all questions of supply as their own exclusive business. On the accession of Henry VIII he was made under sheriff of London. In 1514 he was envoy to the Low Countries, soon after was made a privy councilor, and in 1521 was knighted. In 1523 he became speaker of the House of Commons, and in 1529 succeeded Wolsey in the chancellorship. When Henry began his attacks on the papal supremacy More at once took up the position which his conscience dictated as a supporter of the old system. Henry marked him out for vengeance as an opponent of his matrimonial views, and More endeavored to shield himself by retiring from office. He was requested to take the oath to maintain the lawfulness of the marriage with Anne Boleyn. His refusal to do so led to his committal to the Tower, trial for misprision of treason, and execution. His chief work is the *Utopia* (in Latin), a philosophical romance describing an ideal commonwealth, which evinces an enlightenment of sentiment far beyond that of his time.

Moreau (mo-rō), Jean Victor (1763–1813), French general, b. at Morlaix, in Bretagne. He so distinguished himself that he was named commander in chief of the army of the Rhine

and Moselle in 1796, destined to threaten Vienna simultaneously with the invasion of Italy by Bonaparte. His conduct of the operations, and especially of the retreat to the French frontier in the face of a superior army, showed exceptional strategic power. In 1799 he was in the command of the army of Italy, and next year had the command of the armies of the Danube and the Rhine. Being found guilty of participation in the conspiracy of Pichegru and Cadodal against Napoleon (1804), he had to go into exile, and purchased an estate in Pennsylvania, where he resided some years. He was subsequently induced to aid in the direction of the allied armies against his own country, but was mortally wounded in the battle before Dresden.

More'lia, a town of Mexico, capital of the state of Michoacan, in a valley 6,400 ft. above sea level. It enjoys a mild and salubrious climate, is well built, has a cathedral, several elegant churches, and fine promenades. Pop. about 20,000.

More'los, an inland state of Mexico, south of Mexico, containing the volcano of Popocatepetl; area 2,773 sq. mi.; pop. 141,565.

Morgan, JOHN PIERPONT (1837——), an American financier; b. at Hartford, Conn., Apr. 17, 1837; educated at a high school in Boston and the University of Gottingen, Germany. In 1860 he became the London agent of George Peabody & Co., and in 1871 he became a partner of the Drexels. In 1895 he was the leader of the syndicate which purchased $50,000,000 of United States 4 per cent bonds. He has given much attention to the consolidation of railways it to large corporations, in several of which he holds a controlling interest. His crowning achievement was the formation of the U. S. Steel Corporation (which see). Pl. 32, Vol IV.

Morley, HENRY, LL.D., b. in London 1822; educated at King's College, of which he is an honorary fellow; practised medicine in Shropshire and teaching in Liverpool; and came to London as a journalist in 1851. From 1857 to 1865 he was English lecturer at King's College; since the latter year he has been professor of English language and literature at University College, London, and also at Queen's College. In 1882 he became principal of University Hall. His more important works are connected with the history of English literature, and include *First Sketch of English Literature*, *English Writers*, *English Literature in the Reign of Victoria*, etc. He edited various series of literary works, besides writing many biographies. Died 1894.

Morley, JOHN, author and politician, b. at Blackburn, Lancashire, 1838; educated at Cheltenham and at Lincoln College, Oxford, where he graduated B.A. in 1859. He was called to the bar in 1873; was for some time editor of the *Literary Gazette*, conducted the *Fortnightly Review* from 1867 to 1882, and edited the *Pall Mall Gazette* for three years (1880–83), and *Macmillan's Magazine* for two years (1883–85). He is editor also of the *English Men of Letters* series, to which he contributed the volume on Burke. He is author of a *Life of Cobden*.

Mormons (or Church of Jesus Christ of Latter Day Saints), a religious organization founded by Joseph Smith, of Sharon, Vt., in 1827. Seven years previously, when only fifteen years old, the first two persons of the Trinity had, as he claimed, visited him, which visitation was repeated in 1823, and again in 1827, on which occasion there was delivered into his hands the golden plates of "The Book of Mormon." The plates were nearly eight inches long by seven inches wide, a little thinner than ordinary tin, and bound together by three golden rings. The entire volume was about six inches thick, a part being sealed and a part unsealed. Only that part which was unsealed was revealed to him, the other part being reserved for some future time. The letters, characters, or whatever they might be called, were claimed to be of diminutive size and elegantly executed. They were in a language unknown to moderns, but called by Smith the "Reformed Egyptian." Accompanying the plates were the Urim and Thummim of Scripture, by means of which Smith claimed to have translated the records thus miraculously discovered. Oliver Cowdery, a youthful associate of Smith's, took down the words as Smith read them to him from the plates, and the first edition of the *Book of Mormon* was issued at Palmyra, N. Y., in 1830, Oliver Cowdery, David Whitmer, and Martin Harris united in an affidavit, which prefaced the work, to the effect that they had been shown by an angel who came down from heaven the plates from which the book had been translated, and this testimony was supplemented by that of eight other witnesses, including the father and two brothers of Joseph Smith, all of whom claimed to have seen the original plates, and no one else having been permitted to see them before they were returned to the angel from whom Joseph received them. Cowdery, Whitmer, and Harris all subsequently declared their testimony to be false; but a farmer named Harris having supplied the necessary funds, the book was published, and the new sect of Mormons sprang into active existence, and was the means of making multitudes of zealous converts.

The new sect met persecution from the start. Smith organized a church in Fayette, Seneca co., N. Y., then, guided by a revelation, removed to Kirkland, O., where a bank was started with Smith as president. Despite popular opposition, converts gathered in large numbers from different states, and in 1833 the new church was formally organized under the presidency of Smith, Rigdon, and F. C. Williams; and a missionary, or evangelist, was appointed in a young Vermont painter of ability and originality, named Brigham Young. In 1835 twelve apostles, including Young, were chosen. In 1836 Orson Hyde and Heber C. Kimball were sent as missionaries to England. In 1838 the Kirkland bank failed, and Smith, accompanied by Rigdon, fled to a settlement of the sect that had been started at Independence, Mo. Here serious trouble broke out, and

the denomination, to the number of 15,000, removed to the east bank of the Mississippi River, in Hancock co., Ill., and established a new city, which they called Nauvoo, which for a time flourished surprisingly; but it was not long before new troubles arose. The original *Book of Mormon* contained nothing about polygamy, and the establishment of that practise as an article of faith under a pretended new revelation, aroused popular indignation, and this, together with a practical defiance of the laws of Illinois concerning taxation, occasioned later on what was known as the "Mormon War." Joseph and Hyrum Smith having been arrested for violations of law, were placed in jail in Carthage, where, on the 27th of June, 1844, they were shot to death by a mob. The troops of the state were called out by Governor Ford to quell the disturbance, which had now become general in that section; and the Mormons, under a fresh revelation claimed to have been received by their new leader, Brigham Young, emigrated in a body to Salt Lake City, Utah, where they have since flourished undisturbed. Under a law passed by Congress in 1882, and since materially amended, polygamy has been abolished within the limits of Utah; and since the admission of the territory into the Union as a state, the practise has practically disappeared. The Mormon Church claims 250,000 communicants, 110,000 being in Utah. A body in Iowa and Illinois, under the lead of Joseph Smith, a son of the founder, calling itself the Reorganized Church of Latter-day Saints, numbers 25,000.

Morning-glory, a name given to several climbing plants of the convolvulus family, having handsome purple or white, sometimes pink or pale blue, funnel-shaped flowers.

Morocco (or Marocco), an empire or sultanate occupying the northwest extremity of Africa, bounded by the Atlantic Ocean, the Mediterranean, Algeria, and the desert; area about 300,000 sq. mi. Its most remarkable natural feature is Mount Atlas, the great chain or series of chains extending through it from northeast to southwest, and reaching a height of 12,000 to 13,000 ft. Between the mountains and the sea are table-lands and plains, some of them of great fertility. The climate in many parts is pleasant and temperate, in many others the summer heat is insufferable. The minerals include gold, silver, copper, iron, and lead in larger or smaller quantities. The flora includes the esculent oak, and cork oak; in the higher regions of the Atlas the cedar and Aleppo pine; the date palm and the dwarf palm east and south of the Atlas. Agriculture is in the lowest possible condition, and the annual production is calculated barely to supply the wants of the country. The cereal crops include wheat, barley, and maize; but dhurra or millet constitutes the chief support of the population. The vine is cultivated only near towns for the sake of the fresh grapes and for the raisins. All the fruits of the south of Europe are cultivated to some extent. Among the wild animals are the lion, panther, jackal, hyena, wild boar, gazelle, and several species of large antelope. Cattle and sheep are reared, and the spirited small horses for which the country was once famous are still numerous. There are large numbers of goats, which furnish a principal article of export—the well-known Morocco leather. In general, among the rural population, each family supplies all its own wants. In the towns, however, some manufactures have sprung up, besides the well-known leather. Fez makes and exports the cloth caps which bear its name. Carpets, embroidered stuffs, pottery, arms, are also made. The trade is carried on by caravan with the interior, or by sea with the European states. The Berbers are the oldest inhabitants. The Arabs form the bulk of the rural population in the plains; some of them are cultivators, and others are Bedouin. In the towns along the coast are found the Moors, and a considerable number of Jews inhabit all the commercial towns. To these must be added the negroes and their posterity of every shade. The civilization of Morocco has sunk to a low condition. The sovereign or sultan is absolute in the strictest sense. The imperial revenues are derived from arbitrary imposts on property, duties on imports and exports, monopolies, and fines and confiscations. The military force maintained by the sultan does not ordinarily exceed 25,000. The chief towns are Morocco and Fez, the one in the southwest, the other toward the northeast. Morocco in ancient times formed part of Mauritania, and about 43 A.D. was incorporated in the Roman Empire. In the latter part of the seventh century the Arabs spread over North Africa and took possession of Mauritania. Among ruling dynasties since then have been the Almoravides, Almohades, and others. The present dynasty, the ninth, was founded in 1648. In 1814 the slavery of Christians was abolished, and piracy was prohibited in 1817. The conquest of Algeria brought about complications with France, and the plundering of vessels by pirates has often caused troubles with European powers. In 1859 a war broke out with Spain, owing to attacks made by some of the wild tribes upon the Spanish territory, and resulted in a cession of land and an indemnity of $20,000,000 to Spain. The population is estimated in 1901 at 5,000,000

Morocco, the capital (conjunctly with Fez) of Morocco, lies in the southwest of the country, on an extensive and fertile plain, 1,500 ft. above sea level. It is nearly 6 mi. in circuit, and is walled, though its walls and towers are in a ruinous condition, The streets are unpaved, dirty, narrow, and irregular There are several open areas used as market-places, a covered bazaar, and many mosques. Near the palace, which is on the south of the city, is the Jews' quarter, a walled enclosure of about 1½ mi. in circuit, one-half of it nearly in ruins, very crowded, and excessively filthy. There are several tanning and leather dyeing establishments. Population estimated at 40,000 to 50,000.

Morocco, a fine kind of leather made from the skins of goats, imported from the Levant,

Barbary, Spain, Belgium, etc., tanned with sumach, dyed, and grained, the last process being that which gives it its well-known appearance. It is extensively used in the binding of books, upholstering furniture, making ladies' shoes, etc. Imitation moroccos are made from sheepskins, so perfect in appearance that it is difficult to distinguish them; but they are entirely lacking in the durability of the real article. The art of preparing morocco is said to have been derived from the Moors.

Mor'phia (Morphine), the narcotic principle of opium, a vegetable alkaloid of a bitter taste, first separated from opium in 1816. It forms when crystallized from alcohol brilliant colorless prisms of adamantine luster. As it is very slightly soluble in water, it is never used alone medicinally, but it readily combines with acids forming salts extensively used in medicine. In small doses it is powerfully anodyne; in large doses it causes death, with narcotic symptoms. It is very commonly administered medicinally by subcutaneous or hypodermic injection.

Morphology, a branch both of zoology and botany which deals with the structure and *form* of animals and plants respectively, and their different organs, from those of the lowest to those of the highest type. In morphology questions of *homology* and *analogy* (see *Homologous, Analogue*) are of the greatest importance, and morphology may be said to lie at the foundation of all true systems of classification and arrangement.

Morris, Robert (1734–1806), signer of the Declaration of Independence, was b. in England. In 1775 was delegate to the Continental Congress. To the governments he gave the full benefit of his credit; in 1780 raising $1,400,000 to assist Washington, and organizing the Bank of North America. In 1787 was member of the convention that framed the U. S. Constitution; afterward member of the U. S. Senate. He was offered the post of secretary of the treasury, which he declined.

Morristown, Morris co., N. J., 32 mi. n.w. of New York. Railroad, D. L. & W. Seat of the state lunatic asylum. Shipping center for mining, agriculture, and other produce. Industries include iron works, paper mills, etc. It is a summer resort. The house occupied by General Washington during the Revolutionary War is located here and is the property of the State Historical Society. Pop. 1900, 11,267.

Morse, Samuel Finley Breese (1791–1872), inventor of the electro-magnet telegraph in its first practicable form, b. at Charlestown, Mass. He was educated at Yale College, where he devoted special attention to chemistry and natural philosophy. But in 1811 went to England to study painting under West. In 1813 he was awarded the gold medal of the Royal Academy for his model of the *Dying Hercules*. Returning to the U. S. in 1815, he continued painting, and in 1826 succeeded in establishing the National Academy of Design, of which he was first president. In 1829 he went to Europe for three years, during the return voyage worked out roughly a plan for employing electromagnetism in telegraphy. It was not until 1835, however, that he was able to exhibit an instrument that worked well. By July, 1837, this instrument was perfected, and ultimately in 1843 Congress granted him means to construct an experimental line between Washington and Baltimore. From that time Morse's instrument came into general use in America and Europe. In 1857 the representatives of ten countries voted him $80,000. Pl. 25, Vol. III.

Mortality, Law of, the statement of the average proportion of the number of persons who die in any assigned period of life or interval of age, out of a given number who enter upon the same interval, and consequently the proportion of those who survive. Tables showing how many out of a certain number of infants, or persons of a given age, will die successively in each year till the whole become extinct, are generally called tables of mortality. The average rate of mortality is affected by regular or constant causes, such as race, climate, age, sex, profession, social position, density of population, political institutions, habits, etc., and by such irregular or occasional causes as war, famine, pestilence, etc.; but notwithstanding the interruption of these occasional causes a constant tendency to a mean has been found to exist in any given state of society. The tendency of a population to increase depends rather on the facility of procuring the means of subsistence than on the rate of mortality.

Mortar is a kind of short cannon, of a large bore, with a chamber, used especially for throwing shells. The fire from mortars is what is termed vertical fire, the mortar being directed at a high angle and the shell striking the ground nearly vertically. The principal recommendations of vertical fire are, that the shells search behind cover and produce a great mortal effect, also that at high elevations a great range is obtained with a comparatively small charge of powder.

Mortgage, in law, the conveyance of an estate, real or personal, by a debtor to his creditor, as a pledge or security for a debt. The debtor is called the mortgagor, the creditor mortgagee. The conveyance is absolute in form, but subject to a proviso by which it is to become void, or by which the pledge is to be reconveyed upon repayment to the guarantee of the principal sum secured, with interest, on a certain fixed day. Upon the non-performance of this condition the mortgagee's estate becomes absolute at law, but remains redeemable in equity during a limited period. In general, every description of property, and every kind of interest in which it is capable of absolute sale, may be the subject of a legal mortgage. A mortgagee is not allowed to obtain any advantage out of the security beyond his principal and interest. Though the mortgagee, after the mortgagor's default in payment of the principal sum and interest, has the absolute legal estate, he is still considered in equity to hold only as a security for his debt. In order to obtain absolute possession

of the estate, the mortgagee has to file a bill of foreclosure against the mortgagor, calling upon the latter to redeem his estate forthwith, by payment of the principal money, interest, and costs; and if he fail to do so within the time specified by the court he is forever barred and foreclosed of his equity of redemption, and the mortgagee becomes owner in equity, as he before was in law. In the event of a sale any surplus must be paid to the mortgagor.

Morton, Levi Parsons, vice president of the U. S. from 1889 to 1893, b. at Shorham, Vt., in 1824. He began life as a country store keeper, and eventually worked his way to a membership in a wealthy Boston mercantile firm, and subsequently, in 1854, became the head of the great dry-goods house of Morton & Grinnell, in New York City. In 1863 he founded the banking houses of Morton, Bliss & Co. in New York, and Morton, Rose & Co. in London. He was elected member of Congress from New York in 1878, and in 1881 was appointed minister to France, which position he filled with distinguished credit until 1885. In 1888 he was elected vice-president of the United States, and in 1894 became governor of New York. At the close of his term in 1896 he retired to his vast farm near the Hudson River

Morton, Paul (1857-), an American railroad official and statesman. He began his railroad career in the land office of the Burlington system in 1872, serving as assistant general freight agent, general passenger agent, and general freight agent. In 1890, he resigned to become vice-president of the Railroad Fuel and Iron Company, and in 1895 became second vice-president of the Atchison, Topeka and Santa Fe Railway. He left this position in 1904 to accept appointment as Secretary of the Navy.

Mosa'ic, the derivation is not, of course, from Moses, but from the Muses (Gr. *mousai*), "mousaic" work being artistic pavimentary work. It was, and is, a species of inlaid or tessellated work, made with minute pieces of colored substances, generally either marble or other colored stones, or else glass more or less opaque, and of every variety of hue which the subject may require. The former mode was that chiefly employed by the Romans for their costly tessellated pavements, many of which have at various times been discovered in England. It was applied by them in four different styles; the *opus tesselatum*, the *opus vermiculatum*, the *opus sectile* (these three being purely geometric patterns, in black, white, and red), and the *opus musivum* (or pictorial, in which natural objects were imitated). Examples of pavement mosaics in each of these have been discovered at Pompeii. One of the finest specimens of ancient mosaic is the celebrated pavement, representing a *fête* at the inundation of the Nile, preserved in the Barberini Palace at Palestrina. Mosaic continued to be used both for pavements and ornamenting walls to a late period in the Middle Ages, and was greatly practised by Byzantine buildings, and by Byzantine artists who were also employed in Italy.

There is a species of mosaic of comparatively modern invention, made of a kind of gypsum or talc, which is calcined in a kiln, beaten in a mortar, and sifted. From this material artificial marbles are formed, which are made to imitate precious stones; and from these a mosaic work is composed which is little inferior in luster and durability to the natural stones. Something akin to mosaic or colored inlaid work, but made up of pieces of far greater size, was occasionally employed in Italy during the Middle Ages for external decoration; as an instance of which the façade of the Duomo at Pisa and Giotto's unrivaled Campanile at Florence, etc., may be mentioned; here, though the pattern is chiefly in black and white, brilliant reds and blues are intermixed at intervals.

Although nearly similar as to their process, mosaic pictures, especially some of those of later times, may be considered as a distinct branch of the art. Whether actually employed as pavements or inserted in walls, mosaics of this class consist chiefly of ornament and pattern, executed in few and simple colors, with hardly any attempt at variety of tints and due graduation of tones, even in the figures, human or animal, occasionally introduced in them.

For a long period after the decline of the arts mosaic pictures continued to be employed in Italy, both externally and internally, for the decoration of churches, as, for instance, on the façade as well as within the basilica of St. Mark's at Venice. St. Paul's at Rome, is decorated with portraits of all the popes, from St. Peter himself, in mosaic manufactured at the celebrated studio in the Vatican. The number of enamels of different tints preserved for the purposes of the works at St. Peter's and elsewhere, amounts to no less than 10,000. Each portrait executed in the series already mentioned occupies the entire labor of the artist for twelve months.

The mosaic work so much admired in St. Peter's at Rome, and in London at South Kensington Museum and at St. Paul's Cathedral, etc., is executed with an opaque kind of colored glass. The small pieces (technically called *smalts*) of this material are arranged so accurately, and light and shade are so well observed, that they appear as smooth as marble, and as highly finished as a painting in fresco, with this advantage, that the glass retains its luster forever, while mere paintings soon lose their brilliancy. Some splendid effects are produced by gilding the smalts and glazing over the gold. Many of the ancient Byzantine mosaics have these gold backgrounds, which are imitated in the best modern work. The pieces of glass are laid on a kind of plaster, composed of lime, fine brick-dust, gum-tragacanth, white of eggs, and other ingredients.

Copies of celebrated works by Raphael and other masters have been executed in fine mosaic, and at a little distance have the effect of paintings produced in the usual way, though at infinitely greater cost. Similar mosaic is employed sometimes on a miniature scale for pictures on the lids of snuffboxes and articles

of that kind, which are at the best mere curiosities and very laborious trifles. Florentine work may also be mentioned as a species of mosaic, chiefly used for inlaying or veneering marble slabs for tables, and decorative purposes of that sort upon a moderate scale. In this leaves, petals, stems, etc., are cut out of marble or stone of suitable color and natural shading, and let into the groundwork — a slab usually of black marble; and the whole is then polished to a surface. A beautiful effect is produced by letting in transparent stones or fragments of enamel among the rest, say carbuncles, to represent the cherries in a bunch of fruit and leaves, etc. If at all elaborate the work is very costly.

The manufacture of the highly decorative mosaic pavement of the mediæval period has been revived in this country.

Mos'cow, the second capital of the Russian Empire. It is the chief town of the government of the same name, and is situated in a highly cultivated district on the Moskwa, 400 mi. s.e. of St. Petersburg, with which it is in direct communication by rail. It is surrounded by a wall or earthen rampart 26 mi. in circuit. The quarter known as the Kreml or Kremlin, on a height about 100 ft. above the river, forms the center of the town. It is enclosed by a high stone wall, and contains the old palace of the czars and several other palaces; the cathedral of the Assumption; the church of the Annunciation; the cathedral of St. Michael; the Palace of Arms; and the Tower of Ivan Veliki. Outside the Kreml the chief building is the cathedral of St. Vassili. Among the principal educational establishments is the Imperial University, founded in 1755 by the Empress Catherine. It has a rich museum and a library of 200,000 volumes. Moscow is the first manufacturing city in the empire, and of late years its industrial and commercial activity has greatly increased. The principal manufactures are textile fabrics, chiefly woolen, cotton, and silk, besides hats, hardware, leather, chemical products, beer, and spirits. From its central position Moscow is the great entrepôt for the internal commerce of the empire. The foundation of the city dates from 1147. It became the capital of Muscovy, and afterward of the whole Russian Empire; but was deprived of this honor in 1703, when St. Petersburg was founded. The principal event in the history of Moscow is the burning of it in 1812 for the purpose of dislodging the French from their winter quarters. Pop. 753,469. The government forms an undulating tract of about 13,000 sq. mi., and the soil is mostly productive, the forests occupying about 39 per cent. Pop. 2,183,579.

Moselle (Mo-zel'), a river which rises in France, in the department of Vosges, and which after a winding, and in some parts very tortuous, course falls into the Rhine at Coblenz; total length about 360 mi. The wines of the Moselle basin are well known as light sparkling wines, with a marked aroma.

Moses, leader, prophet, and legislator of the Israelites, was b. in Egypt about 1600 B. C., during the time of the oppression of the Hebrews. His father, Amram, and his mother, Jochebed, both of the race of Levi, were obliged to expose him in obedience to a royal edict, but placed him in a basket of bulrushes on the river border, where he was found by the daughter of the Egyptian king as she went to bathe. She adopted him as her son, and in all probability had him educated for the duties of the priesthood. The promises of God that his race would become a great nation occupied much of his thoughts, and at last God appointed him the chosen deliverer from the bondage in Egypt. Being slow of speech, and possessing none of the arts of an orator, God therefore gave him power to prove his mission by miracles, and joined to him his elder brother Aaron, a man of little energy, but of considerable eloquence. Thus prepared, Moses returned to Egypt at the age of eighty years to undertake the work. At first he had the greatest obstacles to overcome, but after the visitation of ten destructive plagues upon the land, Pharaoh suffered the Hebrews to depart. Moses conveyed them safely through the Red Sea, in which Pharaoh, who pursued them, was drowned with his army. New difficulties arose, however. The distress of the people in the desert, the conflicts with hostile races, the jealousies of the elders, often endangered his authority and even his life, despite the miraculous attestations of his mission. During the term of the encampment at Sinai he received the Ten Commandments and the laws for the regulation of the lives of the Israelites. When they were already near the end of their journey toward Canaan Moses saw himself compelled, in consequence of new evidences of discontent, to lead them back to the desert, for forty years more of toilsome wandering. He was not himself permitted, however, to see the Israelites settled in their new country on account of a murmur which, in the midst of his distresses, he allowed to escape against his God. After appointing Joshua to be the leader of the Hebrews he ascended a mountain beyond Jordan, from which he surveyed the land of promise, and so ended his life in his 120th year.

Mosque, a Mohammedan church or house of prayer. These buildings are constructed in the Saracenic style of architecture, and often astonish by their extent and the grandeur and height of their cupolas or domes. In these Mohammedan places of worship we find neither altars, paintings, nor images, but a great quantity of lamps of various kinds, arabesques which form the principal interior ornament, and sentences from the Koran written on the walls. Every mosque has its minaret or minarets.

Mosquito (mos ke'to), a general name for those insects of the gnat family which inflict a severe bite and make themselves a pest to people residing in warm climates, and during summer to many in temperate and arctic regions. Mosquitoes belong to the order of insects known as *Diptera*, or flies. (See *Insects*, sub-head *Classification.*) There are in

the United States about 24 species of mosquito, all belonging to the gnat family.

The common mosquito or *Culex pungens* of the naturalist may be taken as a type of the entire family. The female pierces the skin and sucks the blood of living animals. The proboscis or beak is needle shaped, slightly enlarged at the end and covered with minute projections that give it, when magnified, the appearance of a coarse, round file. It is particularly fitted for an instrument of torture, and is the principal cause of the irritation arising from mosquito bites. The proboscis of the male is too weak to pierce the skins of animals, and it feeds on the juices of plants.

The eggs of the mosquito are laid in stagnant fresh water, and appear in boat-shaped masses floating on the surface. Each mass is about a quarter of an inch in length and contains from 200 to 400 eggs set on end in a single layer. In warm weather the eggs hatch in about 16 hours, the larvæ appearing as wrigglers. The larvæ live in the water, are very active, and feed upon minute aquatic organisms. They change to the pupa stage in about seven days under favorable conditions. The pupæ float upon the surface and mature in two or three days, when the imago or perfect insect appears. The life-history of the mosquito during the summer is completed within a period varying from 11 to 14 days, and the insects multiply very fast. During cool weather the period of transition is much longer, and many of the larvæ remain through the winter to become perfect insects the next season.

Transmission of Disease by Mosquitoes.—The common mosquito in the United States, and in temperate latitudes generally, does not transmit disease, but in tropical climates its bite is known to cause elephantiasis. Another species, the *Anopheles*, transmits malaria, and a third, the *Stegomya*, propagates yellow fever.

All diseases communicated by mosquitoes are caused by germs. (See *Germ Theory of Disease.*) Elephantiasis is caused by a small, thread-like worm (*Filaria*), which lives in the lymphatic vessels of the skin. Its presence causes the skin to become thickened, rough, warty, livid in color, and insensible to feeling. The filaria multiply and pass from the lymphatics into the blood of the infected individual, where they are found in abundance at night when the patient is asleep. During the day, however, they do not exist in the blood. The young filaria are sucked with the blood of the infected person into the stomach of the mosquito. They remain in the stomach about 17 days, then penetrate the proboscis. When the infected mosquito bites its next victim the filaria escape into the lymphatic vessels of the skin, and there grow to maturity, multiply and produce elephantiasis.

The *Anopholes*: or malaria mosquito, can be easily distinguished from the common species by the spots on its wings. The parasite causing malaria is a minute protozoan, or animalcule, consisting of only one cell, and known as *Hæmamœba.* This parasite infests the red corpuscles of the blood; grows until it occupies the entire corpuscle, then divides into numerous spores which escape into the liquid plasma of the blood and in turn infest other corpuscles. The spores are liberated from all the corpuscles at the same time, and the liberation produces a paroxysm of chills and fever. There are different varieties of parasite, each having its time for dividing into spores. One variety produces the second brood of spores the second day after the first, so that the malarial paroxysms occur every third day; another produces its second brood in three days, and occasions a paroxysm every fourth day, while still another variety causes daily paroxysms.

The presence of the malarial parasite in the blood causes the destruction of red corpuscles in large numbers. Standard authorities estimate that a patient of vigorous constitution during the first four days of daily intermittent fever loses 2,000,000 corpuscles per cubic millimeter of blood, and in certain cases the loss of 1,000,000 corpuscles has been verified at the end of 24 hours. In cases having a duration of 20 or 30 days the number of red corpuscles may be reduced from 5,000,000, the normal number per cubic millimeter, to 1,000,000, or even less. Quinine kills the spores, so is an effective remedy. To secure the best results it should be taken when the paroxysm begins.

The *Stegomya*, or yellow fever mosquito, is found only in the warm regions. It resembles the common mosquito quite closely, but may be distinguished from it by the silver stripes on the thorax and abdomen. While the nature of the yellow fever germ is not yet understood, experiments in Cuba in 1900, under the direction of Dr. Sternberg, Surgeon-General of the United States army, seem to show conclusively that the disease is communicated by mosquitoes. The commission conducting the experiments constructed two rooms for the purpose. One was furnished with beds and bedding which had been used by yellow fever patients. The bedding was not disinfected, or even washed. The room was not ventilated, nor open to the sunlight, but it was protected from mosquitos. Seven non-immune people occupied this room for several days, sleeping in the infected bedding and in some cases wearing the clothing of the yellow fever patients. None of them took the disease. The other room was arranged after the best hygienic plans and was occupied by seven other non-immune persons. Mosquitoes known to have bitten yellow fever patients were placed in this room, and six of the seven people came down with yellow fever. The conclusions of the commission are that yellow fever is not a contagious disease like small pox or scarlet fever, but that it is communicated by these mosquitoes and by them only. The results of these investigations point to the necessity of destroying mosquitoes if we are to prevent the spread of the diseases described.

Mosquito Territory, a region of Central America, lying on the Caribbean Sea, and forming the eastern seaboard of Nicaragua.

For a considerable period it was governed by a native chief, and was under British protection, but in 1860 it was made over to the state of Nicaragua. The capital is called Bluefields.

Mosses, a group of cryptogamic or flowerless plants of considerable extent, and of great interest on account of their very singular structure. They are in all cases of small size, seldom reaching a foot in height, but having a distinct axis of vegetation, or stem covered with leaves; and are propagated by means of reproductive apparatus of a peculiar nature. They are formed entirely of cellular tissue, which in the stem is lengthened into tubes. Their reproductive organs are of two kinds — axillar cylindrical or fusiform bodies, containing minute roundish particles; and thecæ or capsules, supported upon a stalk or *seta*,

Diagram of the Life History of a Moss.— *a.*— spore; *b.*— spore producing the thread-like underground shoots; *c.*— bud which will rise into moss-plant; *d.*— a leaf bearing portion of moss plant; *e.*— apex of moss plant with club-shaped male organs producing male cells, one of which lies between *e* and *f*; *f.*— apex of moss plant with bottle-shaped female organs within which is the female cell; *g, g'.* — spore producing generation which grows from division of fertilized egg cell and upon the female plant.

covered with a *calyptra*, closed by an *operculum* or lid, within which is a *peristome* composed of slender processes named *teeth*, and having a central axis or *columella*, the space between which and the walls of the theca is filled with minute *sporules*. Mosses are found in cool, airy, and moist situations, in woods, upon the trunks of trees, on old walls, on the roofs of houses, etc. The genera of mosses, which are numerous, are principally characterized by peculiarities in the peristome, or by modifications of the calyptra, and of the position of the *urn*, or hollow in which the spores are lodged.

Mosul', a town of Asiatic Turkey, 220 mi. n.w. of Bagdad, on the right bank of the Tigris, opposite the remains of the ancient Nineveh, where there is a bridge of boats. The houses are mostly built of sun-dried bricks, and besides numerous mosques, there are churches of the Nestorians, Jacobites, and other Christians. It has a transit trade between Bagdad, Syria, Kurdistan, and Constantinople. Its principal manufactures are cotton stuffs. It was formerly celebrated also for its muslins. Pop. est. at 40,000.

Moth, the popular name of a numerous and beautiful division of lepidopterous insects, readily distinguished from butterflies by their antennæ tapering to a point instead of terminating in a knob; by their wings being horizontal when resting, and by their being seldom seen on the wing except in the evening or at night. Among the more notable of the moths are the "feather" or "plume moths," the death's-head moth, the "clothes moths," and the "silk moth."

Mother-of-pearl (or Nacre), the hard, silvery, brilliant, internal or nacreous layer of several kinds of shells, particularly of the oyster family, often variegated with changing purple and azure colors. It is destitute of coloring matter, but is composed of a series of minute and slightly imbricated layers or ridges which have the power of decomposing the rays of light, thus producing beautiful iridescent hues. The large oysters of the tropical seas alone secrete this coat of sufficient thickness to render their shells available for the purposes of manufacture. Mother-of-pearl is extensively used in the arts, particularly in inlaid work, and in the manufacture of handles for knives, buttons, toys, snuffboxes, etc

Motley, John Lothrop (1814–1877), historian and diplomatist, b. in Massachusetts. He was educated at Harvard University and at Göttingen in Germany; published two novels called *Morton's Hope* and *Merry Mount*, both of which were unsuccessful; contributed to the *North American Review;* and entered political life as a member of the Massachusetts House of Representatives. He published, after ten years' labor and a journey to Europe, his great *History of the Rise of the Dutch Republic* in 1856, a work which was further developed in the *History of the United Netherlands;* and the *Life and Death of John of Barneveld.* He was ambassador from the U. S. to Vienna in 1861–67, and to London in 1869–70. His correspondence, in two volumes edited by Geo. W. Curtis, has been published.

Mot'mot is a genus of American birds belonging to the order Volitores and family Momotidæ. The motmots resemble the bee-eaters considerably in outward appearance, but they are distinguished by having the margins of the mandibles distinctly notched or serrated for a considerable portion of their length. The tail is long and graduated, and its two middle longest feathers are destitute of vanes for about an inch from the extremity. It has been now placed beyond doubt that the bird picks off the vanes with its bill, and so forms two rackets at the extremity of the tail. Little is known of the habits of these birds, as they are solitary in their disposition, residing, usually in pairs, in the deepest recesses of the forests. They feed principally upon insects, which they capture by pouncing down upon them suddenly. Besides insects, however, they are said occasionally to devour small snakes and lizards, and even small birds, and sometimes to feed upon fruits. According to some they make no nest, but rear their young in a hole in the sand, generally on the side of a hill; others assert that a

nest is made in the holes of trees. The name of *motmot* is said to be derived from the peculiar note of these birds, which is described as resembling those syllables slowly repeated. According to other writers, however, the cry of the motmot is comparable to the syllables *tou-tou*. About seventeen species have been described. The Brazilian motmot, which is not uncommon in several districts of the tropical parts of South America, is about the size of our common blackbird; its general color is green, but the face, and a spot in the middle of the breast, are black, and the head is blue.

Mott, VALENTINE (1785–1865), surgeon, was b. in Glen Cove, Long Island. He studied in London and Edinburgh. In 1811 was professor of surgery in Columbia College; afterward in other colleges. He early gained a world wide reputation for boldness and originality as an operative surgeon. He was the most intrepid operator of his time.

Moulmein (or Maulmain) (möl-mīn′, mälmān′), a seaport of Burmah, division of Tenasserim, at the mouth of the river Salween. It has a good harbor, and a considerable trade chiefly in teak, cotton, rice, tobacco, stick-lac, lead, copper, cocoanuts, hides, and live stock. Pop. 53,107.

Mound Builders.—It was only after a regular trade was established with the Indians that any exact ideas were acquired in regard to the artificial hillocks or mounds which existed in the valleys of the Mississippi, the Ohio, the Missouri and their tributaries, so imposing in their size and number, and the only witnesses of a race whose very name has disappeared. We find them also in Michigan, Wisconsin, Pennsylvania, Iowa, Nebraska, Kentucky, Louisiana, and Arkansas, and the Red River valleys were also peopled by the mound builders, and we find their traces in certain parts of North Carolina and Indiana. The new state of Washington is dotted over with these mounds having an arrangement like that on a five-spot playing card. In Yucatan and Chiapas there are mounds which were already old in the days of the Spanish Conquest. They are rare beyond the Rocky Mountains and rarer still in British America. A Swede named Kahn, who made a voyage to Canada in 1749, first mentions them, and some years later Captain Carver, in his *Travels* mentions a circular wall about a mile in length and 4 ft. in height. Later Squier and Davis treated of the previous discoveries with the precision of modern science. From 1845 to 1847 more than 200 mounds were excavated by them, and their description, published by the Smithsonian Institution, is still the best guide we can follow. The mounds are artificial hillocks of earth or sand—sometimes round, oval, square, and in some cases polygonal or triangular, varying in height from a few inches to 100 ft., and in diameter from 100 to 300 yds. Sometimes they are erected on the summit of a hill; sometimes stretching irregularly in the plains, but whatever their size, shape or object, they show a remarkable analogy to one another and evidently belong to one and the same race. The most important mound still in existence is that of Cahokia in Illinois. This mound rises in the midst of about 60 others in four successive terraces, reaching an elevation of 91 ft. It covers a surface of 12 acres, being almost equal to the great pyramid of Cheops. In demolishing this mound human bones were found, also arrow-heads, flints, and rude pottery.

It is extremely difficult to form a classification of these mounds. One writer (Squiers) classifies them as 1, defensive embankments — a series of fortifications connected by secret passages which actually went under the river bed — by posts of observation and walls to defend the entrances. 2, Sacred enclosures — these mounds invariably present a regular form — square, circular, elliptical, or polygonal. The walls vary in height, so that of course the original height is not known. 3, Temples — the name of temple, or place of adoration, has been given to truncated cones or pyramids, the summit of which is reached by an inclined plane. Like the enclosures they vary in form but always have a platform at the top doubtless intended for the pontiff or sacrificer, hence their name. 4, Sacrificial mounds — these were sometimes in the form of a square or parallelogram, sometimes of a circle or ellipse. They vary in size but all bear the marks of a hot fire, and the excavations furnish proof that the objects offered to the gods, to whom these altars were consecrated, had to be purified in the flames when presented. The offerings evidently varied according to the god they were meant to honor. On one altar thousands of arrow-heads were picked up. Under another mound 600 axes were discovered, strongly resembling our own most primitive axes; under another, copper ornaments with thin sheets of silver, needles of bone or ivory, and beadings cut in leaves of mica. 5, Sepulchral mounds — by far the most numerous class of mounds are those intended as burial places. The most diverse funeral rites are to be found among the mound builders. Sometimes the body was laid horizontally, sometimes bent double; often a number of bodies were piled in a common grave. Frequently a mound covered a solitary skeleton, while in another the dead lay in large numbers. In many districts incineration was the custom, and the ashes were collected and put in urns, sometimes even in human skulls. One of the most curious mounds rises near Summers, Miss. The dead were found laid in successive rows, sometimes singly, sometimes to the number of seven. At the head of the former were placed vases of different sizes and shapes, while no vase or ornament of any kind was to be seen near the others, social inequality surviving death. 6, Effigy mounds are the most curious of all the numerous mounds. They are of diverse forms, grouped without any apparent order, and represent animal forms, men, mammals, birds, reptiles, tortoises, and even a spider can be found, whose body and legs cover nearly an acre of ground. In some places, with an effort of the imagina-

tion, elks, bears, panthers, wild geese, and even frogs can be recognized. The most celebrated of these effigy mounds is the Serpent, erected on a hill overlooking Brush Creek, Adams co., Ohio, and now belonging to the Peabody Museum, and surrounded by a public park. The folds of the serpent give a length of 700 ft.; in the mouth is an egg, represented by an elliptical mound, the large axis of which measures 160 ft. Sometimes the mounds are formed after inanimate objects, such as the Cross Mound on the shores of Lake Michigan; a Greek cross in Ohio, 28 yds. long, and a mound on the banks of the Scioto representing a boat 52 x 29 yds.

The ceramic fabricated by the mound builders was superior to that of prehistoric times among the nations of Western Europe. Their pottery was made of clay, dark gray in color, often with a shade of blue in it. It is possible that they arranged the pieces to be baked in holes hollowed in the ground and heated with lighted chips. Some of their vessels have a capacity of over ten gallons, others of several quarts. Some of the pottery is painted, usually black or very dark gray, but sometimes red, yellow, white, or brown. The ornamental parts are often distinguished by different colors, and the shading of tones is always tastefully done. The coloring matter used in the decoration of pottery is unknown. Among the articles of pottery obtained from the mounds were necked vases, cooking vessels, sometimes provided with a cover, and nearly always with handles, lamps generally of black pottery, tureens or basins, cups and pipes. The number of pipes found in the mounds show to what an extent the practise of smoking had developed among the mound builders. At Mound City four pipes were found with human profiles of a singularly characteristic type. One pipe representing a woman, will stand comparison with the Mexican sculptures, while one was found in Indiana representing on its alternate faces a death's head and the head of a goose. But few facts are known regarding the religious sentiments of the mound builders. Many statuettes representing the human form have been found, which are supposed to be images of the gods the people adored. The type represented is pretty much alike in all; the workmanship is rude, forming a striking contrast with that of some of the pipes and pottery. It is also thought that the rings in the ground, so common in regions once occupied by the mound builders, were consecrated to the sun and that to the sun the people addressed their prayers.

The weapons discovered in the mounds consist mainly of arrow-heads. In some places actual reserves have been found, where arrow- and spear-heads have been stored. Their weapons were made of quartzite, jasper, granite, and many kinds of stone, highly polished. Among the mound builders' ornaments are pearls, shells, perforated teeth of animals, bones of small birds, claws of wild beasts, rings and earrings of copper sometimes covered with a film of silver. The copper used

by them probably came from the Lake Superior mines. The methods of working the mines were very simple. The miners kindled large fires under the rock until it became brittle, then broke it with mallets. A number of these mallets have been found near the hardest rocks. Analysis of the Lake Superior copper has shown its identity with that used by the mound builders. They appear also to have known gold, silver, and even iron. These metals were, however, rare among them. Until late years only a few bones were found which could with certainty be connected with the mound builders. The ossarium brought to light in the Little Miami valley contained over 1,200 skeletons. Some writers claim that the present day Indians are the representatives of the mound builders; others hold that the race which raised the great mounds has disappeared.

Mountain, a mass of earth and rock rising above the surface of the globe higher than a hill. Mountains are usually found in groups, systems, ranges, or chains, though isolated mountains, due to volcanic action, are also found. The elevation of great mountain masses is due to giganic subterranean movements long continued; but mountains of considerable mass have also been carved out by surface denudation. The highest mountain in the world is Mount Everest, one of the Himalayan range, which is 29,002 ft. above the level of the sea. There are three important methods of measuring mountains, namely, by the barometer; by observation of the boiling point of water, and by calculation from data supplied by accurate surveying instruments, the necessary formulæ being supplied by trigonometry. This last is by far the most accurate method.

Mount Vernon, Fairfax co., Va., on the Potomac River, 15 mi. below Washington. Here is the estate and former residence of George Washington. The house was built by Lawrence Washington in 1743, but upon his death it came into possession of his brother George. The house, located on a hill commanding a delightful view of the Potomac River, is a two-story structure, 96 ft. long, with a piazza, with columns, along the front. Here George Washington resided until his death, when the estate descended to Bushrod Washington, and after his death to John A. Washington, who, in 1858 sold the house and 200 acres of land to the Ladies' M. V. Association to be kept as a place of public interest. If this association fails to fulfill the terms of the contract, the property will come under the control of the state of Virginia.

Mourning, as the outward expression of grief, has greatly varied at different times and among different nations. Thus the Eastern nations and the Greeks cut off their hair, while the Romans allowed the beard and hair to grow; and as an evidence of mourning, the ancient Egyptians wore yellow; the Ethiopians, gray; the Roman and Spartan women, white, which is still the color of grief in China, Japan, and Siam; in Turkey, blue and

violet; and in the other European countries black is used for this purpose. The Jews, in sign of grief at the loss of their relatives, rent their garments, tore out their hair, and wore coarse garments of a dark color; and with the Greeks and Romans it was the custom to lay aside all ornaments of dress, to abstain from the bath, and other indulgences.

Mouse, the name of a number of rodents of which the most familiar is the domestic mouse, too well known to need description. The harvest mouse, the smallest of quadrupeds, is a hibernating mammal, and constructs a little nest of grass, etc., entwined round and supported by the stalks of the corn or wheat. The common field mouse is a dusky brown, with a darker strip along the middle of the back, while the tail is of a white color beneath. There are about a hundred members of the mouse genus of which the common rat is one. The short-tailed field mouse, or "meadow mouse," is not a true mouse, but one of the voles. It is of a reddish-brown color, inclining to gray, the under parts are lighter, or ashy-brown, and the tail and feet are of a dusky-gray color. The dormouse also is of a different family from the true mice.

1.—Harvest mouse. 2.—Long tailed field mouse.

Mouse-ear Chickweed, a genus of plants, natural order Caryophyllaceæ, consisting of many pubescent herbs with small leaves and white flowers, forming common weeds in all temperate and cold regions. The Virginia mouse-ear is found from Canada to Florida.

Moxa, a soft downy substance prepared in China and Japan from the young leaves of certain species of *Artemisia*. In eastern countries it is used for the gout, etc., by burning it on the skin. This produces a dark-colored spot, the exulceration of which is promoted by applying a little garlic.

Mozambique (mo-zam-bēk′), a Portuguese government on the east coast of South Africa, extending from Cape Delgado to Delagoa Bay, and to an uncertain distance into the interior; area estimated at about 380,000 sq. mi., only a small part of which is occupied. The coast is generally low, beset with reefs and small islands, and possessed of very few good harbors. Inland there rises a broad plateau, with groups and chains of mountains running mostly parallel to the coast, and nowhere reaching a great height. The climate is excessively hot, and, except on the elevated regions, unhealthy. Most tropical fruits thrive, cotton succeeds well, and the forests produce valuable woods. The principal articles of trade are ivory and skins. The capital is the town of Mozambique, situated upon a small coral island near the coast, having a good harbor and a small trade. Pop. 8,522. The population of the country is quite uncertain.

Mozambique Channel, the passage between the east coast of Africa and the island of Madagascar; length about 1,050 mi., average breadth about 450 mi. In its north part lie the Comoro Islands.

Mozart (mo-zärt′), Johann Chrysostomus Wolfgang Amadeus (1756–1791), a great German composer, b. at Salzburg. In his sixth year Mozart was taken by his father, along with his sister, to Munich and Vienna, where the little artists were received at court with great favor. In 1763 the family made a journey to Paris, where Mozart published his first sonatas for the harpsichord; and in the following year they proceeded to England, where the child-musician performed before the court the most difficult compositions of Bach and Handel. Returning to Salzburg after visiting Holland, the family again went to Vienna in 1767. In 1769 Mozart, who had been made master of the concerts at the court orchestra at Salzburg, commenced a journey to Italy in company with his father. In Rome he wrote down, on hearing it, the famous *Miserere*, annually sung in the Sistine Chapel during the holy week. At Milan in 1770 he composed, in his fourteenth year, his first opera, *Mithridates*, which was performed more than twenty times in succession. Henceforth he resided chiefly in Salzburg, but also visited Paris, Munich, and finally Vienna. In the latter city the most of his best works, such as his famous operas, *The Marriage of Figaro*, *Clemency of Titus*, *The Magic Flute*, and his last work the *Requiem*, were written. The extent of work done by Mozart during his short life is almost incredible, and in every kind of composition, whether vocal or instrumental, he excelled. Pl. 19, Vol. II.

Mt. Carmel, Northumberland co., Pa., 140 mi. n.w. of Philadelphia. Railroads: Pennsylvania; Lehigh Valley; and Phila. & Reading. Industries: mining, iron foundry, planing mill, packing houses, etc. Coal in vicinity. Surrounding country agricultural and mineral. The town was first settled in 1848. Pop. 1900, 13,179.

Mt. Sterling, Montgomery co., Ky., on Hinkston Creek, 34 mi. e. of Lexington. Railroads: Chesapeake & Ohio, and Kentucky & South Atlantic. Industries: distillery, two flouring mills, woolen mill, two sawmills, two planing mills, and tobacco factory. Coal, oil, and natural gas in vicinity. Surrounding country agricultural. The town was first settled in 1792. Pop. 1900, 3,561.

Mt. Vernon, Knox co., O., on Kokosing River, 45 mi. n. of Columbus. Railroads: B. & O., and C. A. & C. Industries: manufacture of engines, two flouring mills, two iron foundries, furniture, bridge, marble, carriage, furnace, and other factories. Surrounding country

agricultural. The town was first settled in 1805 and became a city in 1812. Pop. 1900, 6,633.

Mt. Vernon, Westchester co., N. Y., on Brown River, 13 mi. e. of N. Y. Railroads: N. Y., N. H. & H., and N. Y. C. & H. R. Industries: woodworking, rubber, guitar, and other factories. Surrounding country agricultural and residence parks. The town was first settled in 1851 and became a city in 1892. Pop. 1900, 20,346.

Mucilage, a solution of some gummy substance in water, giving it a certain consistence; in chemistry, one of the proximate elements of vegetables, a carbohydrate. It is contained abundantly in gum tragacanth, many seeds, as linseed, quince seed, etc., and certain roots, as marsh mallow. It forms a thick jelly with water, and when boiled with dilute sulphuric acid gives rise to a sugar and a gum.

Mucus, a viscid fluid secreted by the mucous membrane of animals, which it serves to moisten and defend. It covers the lining membranes of all the cavities which open externally, such as those of the mouth, nose, lungs, intestinal canal, urinary passages, etc. It is transparent, glutinous, thready, and of a saline taste; it contains a great deal of water, chloride of potassium and sodium, lactate of sodium and of calcium, and phosphate of calcium. Mucus forms a layer of greater or less thickness on the surface of the mucous membranes, and it is renewed with more or less rapidity. Besides keeping these membranes in a moist and flexible condition, it also protects them against the action of the air, of the aliment, the different glandular fluids and agencies that might otherwise irritate and inflame.

Mud Bath, a kind of bath connected with some mineral springs, consisting of mud transfused with saline or other ingredients, in which patients suffering from rheumatism, etc., plunge the whole or portions of the body. Such are the mud baths of St. Amand, or of Barbotan, in France.

Muez'zin (or Mued'din), a Mohammedan crier attached to a mosque, whose duty it is to proclaim the *ezam* or summons to prayers five times a day—at dawn, at noon, 4 P. M., sunset, and nightfall. He makes his proclamation from the balcony of a minaret; and as this elevated position enables a person to see a good many of the private proceedings of the inmates of the neighboring houses, the post of muezzin is often intrusted to a blind man.

Mufti, in the Turkish Empire a religious officer who exercises the functions of an authoritative judge in matters of religion. The muftis are chosen from among the ulemas or doctors of the law, and the grand mufti or Sheikh-ul-Islam is the highest officer of the church and the representative of the sultan in spiritual matters.

Mühlhausen (mül'hou-zn), a town of Prussian Saxony, on the Unstrut, 29 mi. n.w. of Erfurt. It has two interesting churches, an old townhouse, a gymnasium, and manufactures of woolen and cotton cloth, leather, sewing machines, etc. It was formerly a free city of the empire. Pop. 25,141.

Mühlhausen (or Mülhausen), a town of Germany, situated on the Ill, in Alsace-Lorraine, 61 mi. s.s.w. of Strasburg. The town is an important industrial center, having extensive manufactures of cotton printed and other goods, cotton yarn, woolen cloth and yarn, damask, starch, chemicals, metal goods, sewing machines, colors, cement, etc. After belonging to the Swiss Confederation it was incorporated (1798) with France, and ceded by the latter (1871) to Germany. Pop. 69,750.

Mühlheim (or Mülheim) (mül'hīm), a town of Germany, situated on the Rhine nearly opposite Cologne. It has manufactures of velvet, silk, ropes, sail cloth, leather, etc. Pop. 24,975.

Mühlheim (or Mülheim), a town of Germany, in the Rhine valley, on the Ruhr, 14 mi. n. of Düsseldorf. It has cotton spinning, weaving, and cloth manufactures, iron foundries, etc. Coal is mined here, and forms an important article of trade. Pop. 24,465.

Mukden (mu̇k'den) (Moukden, or Fungtien-fu), a town of China, capital of Manchuria and of the province of Leao-Tong, about 380 mi. n.e. of Peking. It is surrounded by a wall and has also a wall which encloses the government offices, palace, and other buildings, and it was the residence of the Manchu sovereigns before their conquest of China. Pop. about 150,000.

Mulberry, a fruit tree. The black or common mulberry is the only species worthy of being cultivated as a fruit tree. The fruit in

Common Mulberry.

England is used at dessert, and also preserved in the form of a syrup. The juice of the berries mixed with that of apples forms a beverage of a deep port wine color, called mulberry cider. The white mulberry is the most interesting of the genus, on account of its leaves being used for food by silkworms. It grows to the height of 40 or 50 ft., with a trunk 2 or

more feet in diameter. It came probably from China. The red mulberry has fruit of a deep red color, and is a valuable American tree. The paper mulberry is a distinct genus, belonging originally to Japan, and now much cultivated in Europe. In Japan its bark is used in making paper, and its wood is highly valued for ornamental work.

Mule, the name applied to any animal produced by a mixture of different species, but specifically denoting the hybrid generated between an ass and a mare. The head of the mule is long and thin, its tail is bushy, and its mane short. The mule is employed as a beast of burden in Spain, Portugal, Italy, in the East, and in Spanish America. It unites the speed of the horse with the dogged perseverance of the ass, and is docile in temper when fairly treated.

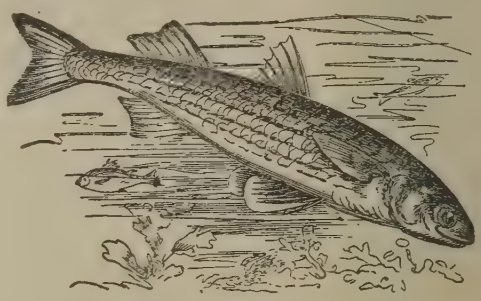
Mull, an island on the west coast of Scotland, one of the Hebrides, belonging to Argyllshire, from which it is separated by the Sound of Mull and the Frith of Lorne; length 30 mi., breadth 29 mi. The island is for the most part mountainous, the highest point being Benmore, 3,185 ft. above sea level. The land in some parts is adapted for grazing, and there are numerous fresh-water lochs. The only town is Tobermory. Pop. 5,229.

Müller (mül'ẽr), Friedrich Max (1823–1900), a celebrated philologist, son of the German poet Wilhelm Müller, was b. at Dessau, entered the University of Leipsic, where he studied Sanskrit under Brockhaus, and published (1844) the *Hitopadesa*, a collection of Sanskrit fables; went to England in 1846, and established himself at Oxford, where he became ultimately sublibrarian at the Bodleian library, and professor of comparative philology, a position which he held until his death, though he practically resigned in 1875. He was a foreign member of the French Institute, and an LL.D. of Cambridge and Edinburgh. His numerous writings included an edition of the *Rig-Veda* (6 vols.); *History of Sanskrit Literature; Lectures on the Science of Language* (in several editions); *Chips from a German Workshop* (4 vols.); *On the Origin and Growth of Religion; Selected Essays* (2 vols.); *The Science of Thought* (1887); *Biographies of Words* (1888); *Natural Religion* (1889); and he was the editor of the series of *Sacred Books of the East* undertaken by the university.

Müller, Wilhelm (1794–1827), a German poet, b. at Dessau. He studied at Berlin; volunteered in 1813 into the Prussian army, and was present at the battles of Lützen, Bautzen, Hanau, and Culm; journeyed to Italy in 1819; and on his return was appointed teacher of Latin and Greek at Dessau. His chief poetical works are lyrical, and are very popular in Germany. He also published the *Library of the Seventeenth Century German Poets.* His son was the well-known Friedrich Max Müller. See above.

Müller, William James (1812–1845), landscape and figure painter, b. at Bristol. He studied painting under J. B. Pyne, and first exhibited in the Royal Academy in 1833. In 1833–34 he visited Germany, Switzerland, and Italy, and in 1838 Greece and Egypt; while in 1843 he accompanied, at his own expense, the Lycian expedition under Sir Charles Fellowes, bringing back many sketches and pictures of Oriental life and scenery. His pictures, though not numerous, are of exceptional power and merit, among the more notable being the *Baggage Wagon, Dredging on the Medway*, and *The Slave Market*, all exhibited in the Manchester collection of 1887, and the *Salmon-weir* at South Kensington.

Mullet, a name common to two groups of fishes, viz., the gray mullets and the red mullets. Naturalists, however, generally restrict the name to the former, designating the red mullets as surmullets. Of the true mullets the best known is the common gray mullet, found around the shores of Western Europe, and in particular abundance in the Mediterranean. It grows to the length of 18 to 20 in., and will sometimes weigh from 12 to 15 lbs. It has the habit of rooting in the mud or sand in search of food. Another species also called gray mullet, a native of the Mediterranean, is distinguished by having its eyes



Gray Mullet.

half covered by an adipose membrane. It weighs usually from 10 to 12 lbs., and is the most delicate of all the mullets. Of the American species, the striped mullet is found from N. Y. southward and appears in the markets in early autumn.

Mullion, a vertical division between the lights of windows, screens, etc., in Gothic architecture. Mullions are rarely found earlier than the Early English style. The term is also applied to the division between the panels in wainscoting.

Mulock, Dinah Maria. See *Craik.*

Mulready, William (1786–1863), R. A., was b. at Ennis, Ireland. He became a student of the Royal Academy about 1800. Among the most popular of his numerous pictures were *The Wolf and the Lamb, The Last In, The Seven Ages of Shakespeare, The Sonnet*, illustrations to *The Vicar of Wakefield, The Whistonian Controversy, Choosing the Wedding Gown, Burchell and Sophia, Women Bathing*, and *The Toyseller.*

Multan', (or Mooltan'), a city of India in the Punjab, the chief city and capital of a district of same name. The streets are mostly narrow and tortuous. It is one of the most ancient cities in India, and is the center of a large trade. Pop. 68,674. The district has an area of 5,880 sq. mi.: pop. 551,964.

Mummies, dead human bodies embalmed and dried after the manner of those taken from Egyptian tombs. An immense number of mummies have been found in Egypt, consisting not only of human bodies, but of various animals, as bulls, apes, ibises, crocodiles, fish, etc. The processes for the preservation of the body were very various. Those of the poorer classes were merely dried by salt or natron, and wrapped up in coarse cloths and deposited in the catacombs. The bodies of the rich and the great underwent the most complicated operations, and were laboriously adorned with all kinds of ornaments. Embalmers of different ranks and duties extracted the brain through the nostrils, and the entrails through an incision in the side; the body was then shaved, washed and salted, and after a certain period the process of embalming, properly speaking, began. The whole body was then steeped in balsam and wrapped up in linen bandages; each finger and toe was separately enveloped or sometimes sheathed in a gold case, and the nails were often gilded. The bandages were then folded round each of the limbs, and finally round the whole body, to the number of fifteen to twenty thicknesses. The head was the object of particular attention; it was sometimes enveloped in several folds of fine muslin; the first was glued to the skin, and the others to the first: the whole was then coated with a fine plaster. The Persians, Assyrians, Hebrews, and Romans had all processes of embalming, though not so lasting as that of Egypt. The art was also practised by the Guanches of the Canaries, the Mexicans, Peruvians, etc. Natural mummies are frequently found preserved by the dryness of the air.

Mumps, a disease consisting in a peculiar and specific unsuppurative inflammation of the salivary glands, accompanied by swelling along the neck, extending from beneath the ear to the chin.

Münchhausen (mün*h*'hou-zn), Karl Friedrica Hieronymus, Baron von (1720–1797), a German officer, b. in Hanover. He served several campaigns against the Turks in the Russian service 1737–39. He was a passionate lover of horses and hounds, of which, and of his adventures among the Turks, he told the most extravagant stories; and his imagination finally so completely got the better of his memory that he really believed his most improbable and impossible fictions. Baron Münchhausen's *Narrative*, a small book of 48 pages, appeared in London in 1785. Two years after it was translated into German by Bürger, who naturally passed in Germany for the writer. The real author was Rudolf Erich Raspe (1737–94).

Muncie, county seat of Delaware co., Ind., 54 m. e. of Indianapolis, on the White river, and on the Lake Erie & Western, the Clev., Cinn., Chi. & St L., and the Ft. Wayne, Cinn. & Louisv. railroads. It is in the center of the great Indiana natural gas belt, and has important manufacturing industries, chief of which are the iron and steel works. Other extensive industries are glass works, foundries and machine shops, carriage and wagon works, printing and publishing, flour mills and lumber mills. Muncie has electric lights, an electric street railway system and a public library (founded 1874). It is the seat of the Eastern Indiana Normal School. Pop. 1900, 20,942.

Munich (mū'nik; German, *München*), the capital city of Bavaria. It lies on an extensive but uninteresting plateau, about 1,700 ft. above sea level, chiefly on the left bank of the Isar. The old town has a quaint and irregular character, but the new town, which has sprung up chiefly to the north and west, has a regular and imposing appearance, and altogether Munich is one of the finest towns in Germany. Vast improvements are due to the munificence of King Ludwig I. The royal palace forms a very extensive series of buildings chiefly in the Italian style, and contains many magnificent apartments and rich, artistic and other treasures. Connected with it are the court church and the court and national theater, among the largest in Germany. Munich is famous for its art galleries, especially the Old and New Pinakothek, the Glyptothek, and the Chack Gallery. The great Bavarian National Museum is world renowned. The royal library has upward of 1,000,000 volumes and 30,000 MSS., being thus one of the largest in Europe. The university is attended by some 2,500 students, and has a library of 300,000 vols. There is an academy of science, an academy of arts, and many fine churches, including the cathedral, founded in 1488. A fine theatre for the presentation of Wagnerian opera, modeled after the one at Bayreuth, was recently opened. There are many beautiful monuments in Munich. The so-called English Garden (laid out by Count Rumford) is a fine park of 600 acres watered by two arms of the Isar. The industries are numerous, and in some particular branches have acquired a high name. Among others may be mentioned painted glass and other artistic productions, mathematical, optical, and surgical instruments, gold and silver lace, jewelry, glass, carriages, bells, musical instruments, etc. Munich is the seat of the high courts of legislature and of law, and of all the more important offices of the state. It was founded by Henry, duke of Saxony, in 962; taken by Gustavus Adolphus in 1632, by the French under Moreau in 1800, and by Napoleon in 1805. Pop. 348,317.

Murat (mū-rä), Joachim (1771–1815), French marshal, and for some time king of Italy, the son of an innkeeper at Cahors. His fate placed him in connection with Bonaparte, whom he followed to Italy and Egypt, becoming general of division in 1799. In 1800 he married Caroline, the youngest sister of Bonaparte. He was present at the battle of Marengo, and in 1804 was made marshal of the empire, grand admiral, and prince of the imperial house. In the war of 1806 with Prussia, and of 1807 with Russia, he commanded the cavalry, and in 1808 he commanded the French army which occupied Madrid. He anticipated receiving the crown of Spain, Charles IV having invested him with royal authority; but Napoleon, who destined Spain for his brother Joseph, placed

him on the throne of Naples, July 15, 1808. He then took the title of *Joachim Napoleon.* He shared the reverses of the Russian campaign in 1812, and in 1813 again fought for Napoleon, whose cause he deserted after the battle of Leipsic. He took up arms again in 1815 for Napoleon, but being defeated by Generals Neipperg and Bianchi near Tolentino, May 2 and 3, he was forced to leave Italy, and took refuge in Toulon. After the overthrow of Napoleon he escaped to Corsica, and set sail for the Neapolitan territory with a view to recover his kingdom. He landed at Pinzo on October 8, but was immediately captured, tried by a court martial, and shot.

Murcia (mụr'thi-å), a city of Southern Spain, capital of the ancient kingdom and modern province of same name. Among the public buildings the most important is the cathedral, whose principal façade, a combination of Corinthian and Composite architecture, produces a fine effect. It was begun in 1353. The episcopal palace is one of the finest in Spain. There are manufactures of woolens, silk stuffs, linens, etc. Pop. 93,546. The province formed part of the ancient kingdom of Murcia; area 5,970 sq. mi.; pop. 462,182. A considerable portion is composed of ranges of hills, containing mines of copper, iron, lead, and silver, and quarries of marble. There are also extensive plains, which are rendered amazingly fruitful by irrigation.

Munkacsy (mụn'kåch-i), Mihaly (1846-1900) real name, *Michael Liel,* Hungarian genre and historical painter, b. at Munkacs, studied at Gyula, Vienna, Munich, and Dusseldorf, and settled in Paris in 1872. Among his best known pictures were *Last Day of a Condemned Man, Milton Dictating Paradise Lost, Christ before Pilate,* and *The Crucifixion.*

Munster, the s. w. province of Ireland, comprising the six counties of Clare, Cork, Kerry, Limerick, Tipperary, and Waterford. Area 9,475 sq. mi. Pop. 1,168,994.

Münster (mụn'stêr), a town of Prussia, capital of the province of Westphalia, in a wide plain on the Aa, 78 mi. n.n.e. of Cologne. The manufactures include woolen, linen, and cotton goods, etc. The most memorable events in the history of the town occurred in 1532–35, when it fell into the hands of the fanatical Anabaptists. Pop. 44,060.

Murad V, Sultan of Turkey, b. 1840. Son of Abdul-Medjid, he succeeded to the throne on the forcible deposition of Abdul Aziz in 1876, but was deposed in the course of the same year on account of insanity, and was succeeded by his younger brother Abdul Hamid.

Mural Circle, an astronomical instrument consisting of a telescope attached to a vertical brass circle which turns upon an axis passing through a stone pier. The brass circle revolves exactly in the plane of the meridian, and is carefully divided into degrees and minutes. Attached to the stone pier, and at equal distances apart, are six microscopes for the purpose of viewing the graduated circle and determining exactly its position and consequently that of the telescope. Is is regarded as the principal fixed instrument in all the great public observatories. Its chief use is to measure angular distances in the meridian, and so to determine the declination of a star, or its distance from the celestial equator. The right ascension of a star being given by the transit instrument, and its declination by this, its exact position is determined.

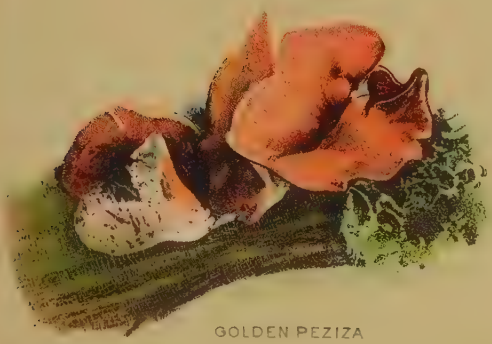
Murder, the act of unlawfully killing a human being with premeditated malice, the person committing the act being of sound mind and discretion, and the victim dying within a year and a day after the cause of death administered. In the U. S. the law recognizes degrees in murder, and in France and some other civilized nations "extenuating circumstances" are taken into consideration.

Murdoch (mur'do*h*), William (1754–1839), an inventor, b. near Auchinleck, Ayrshire, England. His father was a millwright and miller, and under him William worked till he was twenty-three years of age. He then went to Birmingham, where he obtained employment in the engineering establishment of Boulton & Watt. A demand for Watt's engines was fast rising in the Cornish mines, and Murdoch was soon sent thither to superintend the erection and fittings of these. At Redruth, in 1784, he constructed a model, high pressure engine to run on wheels, the precursor of the modern steam locomotive; a year later he invented the oscillating engine, the system of which is still in use; and the rotary engine with sun-and-planet circular motion is also his invention. He made many improvements on Watt's engine on the lines of economizing steam and securing simplicity. About the end of the century he was made manager of the works of Bolton & Watt, being afterward admitted as a partner. In 1803 he constructed a steam-gun; and some time later produced the well-known cast-iron cement made of iron borings and sal-ammoniac. In 1815 he introduced the hot-water apparatus which, with certain slight modifications, is now so extensively used for heating large buildings and conservatories. Various other inventions of his might be mentioned; but his work as a gas inventor remains his most conspicuous achievement. In 1792 he first lighted his offices and cottage at Redruth with coal gas, but it was not till 1798 that he constructed his first extensive apparatus at Birmingham for the making, storing, and purifying of gas, with a view to the supply of factories. Not long after this the offices at Soho were lighted with gas, and the new illuminant was brought prominently before public notice in 1802, when the exterior of the factory was lighted up in celebration of the Peace of Amiens. His great invention was never patented. He retired from business in 1830.

Murger (mûr-zhār), Henri (1822–1861), b. at Paris. He lived a life of extreme privation; formed an informal club or society of unconventional young artists and authors similarly situated which was named "Bohemia," and the associates "Bohemians"—a name famous in general literary history. He contributed a

EMETIC RUSSULA

GOLDEN-FLESH BOLETUS



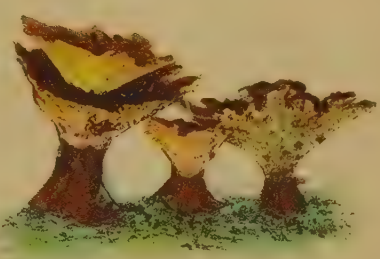
GOLDEN PEZIZA

FLY MUSHROOM

UNCERTAIN HYPHOLOMA

MYCENA HAEMATOPODA

CLAVARIA FORMOSA



THE POLYPORUS

MUSHROOMS.

great mass of "copy" to numerous periodicals, and at last made a reputation by his *Scènes de la Vie de Bohême.* He also published two volumes of poetry, *Ballades et Fantasies,* and *Les Nuits d'Hiver;* and wrote dramas for the Luxembourg theater, and tales, etc., for the *Revue des Deux Mondes.*

Murillo, Bartolomé Estéban (1618–1682), the greatest of Spanish painters, b. at Seville. In 1642 he visited Madrid, and was aided by Velasquez, then painter to the king, who procured him permission to copy in the Royal Galleries. Murillo returned to Seville in 1645, where he commenced that great series of works which have now made his name so glorious. He married a lady of fortune in 1648, which much aided his personal influence, and he succeeded in establishing an academy of the arts at Seville in 1660, and acted as president the first year. In his early career he painted many pictures of humble life with much charm of grace and humor; but his most celebrated pictures are of a later period, and treat religious subjects with a mingled idealism and realism, and a richness of coloring which has seldom been attained. Pl. 30, Vol. IV.

Murray, the largest river in Australia, rises in the Australian Alps about 36° 40′ s. and 147° e., its sources being partly in New South Wales, partly in Victoria; flows for a long distance westward, forming the boundary between the two colonies; then passes into South Australia, where it takes a southern direction, and falls into the sea through a large, shallow sheet of water called Lake Alexandrina. There is a sand bar at the mouth which impedes navigation, but small steamers ascend the river as high as Albury, 1,700 mi. from its mouth. Its chief tributaries are the Murrumbidgee, the Darling, and the Lachlan. The Darling before its junction with the Murray may even be considered the main stream.

Murray, David Christie (1847–), novelist; commenced life on the Birmingham press, was connected with London newspapers, and acted as special correspondent during the Russo-Turkish War. He then took to fiction, and has written a number of popular novels, among them *Aunt Rachel, The Weaker Vessel, The Way of the World,* etc.

Murray, John (1778–1843), eminent London publisher (father's name MacMurray). He began business when quite young, early attained success, and became the friend of as well as publisher for some of the chief writers of the day, including Byron, Moore, Rogers, Campbell, Crabbe, Washington Irving, etc. He started the *Quarterly Review* in 1809. The well-known *Hand-Books for Travelers* were originated by his son.

Murray, Lindley (1745–1826), grammarian, b. in Pennsylvania, of Quaker parents, in 1745, d. 1826. About the age of twenty-one he was called to the bar, and acquired an extensive practise. On the outbreak of the Revolutionary War he retired to the country, but for four years after engaged in mercantile pursuits, and by the close of the war had realized a competence. In 1784 he went to England, and purchased the estate of Holdgate, near York, where he passed the remainder of his life. He wrote, besides his well-known *English Grammar,* several works on education and morals.

Murrumbid'gee, a large river of Australia, in New South Wales, rising in the great Dividing Range, and entering the Murray after a westward course of about 1,300 mi.; chief tributary, the Lachlan.

Murshidabad' (or Moorshedabad), a city of India, Bengal, capital of a district of same name, on the left bank of the Bhagirathi. The city, with its suburb Azimganj on the opposite bank of the river, is the chief center of trade and manufacture in the district. The industries include the embroidery of fancy articles with gold and silver lace, ivory carving, and the making of musical instruments. Pop. 46,000. The district of Murshidabad has an area of 2,144 sq. mi. and a pop. of 1,226,790.

Muscat (or Maskat), the chief city of the sultanate of Omán, or Muscat, a seaport on the Indian Ocean, near the east angle of Arabia. The town stands in a hollow, under cliffs 400 ft. or 500 ft. high. The streets are extremely narrow, and the town is one of the hottest places in the world. It is an important center of trade, exporting coffee, pearls, mother of-pearl, dye stuffs, drugs, etc., and importing rice, sugar, piece goods, etc. Pop. of town and suburbs est. at 60,000.

Muscatine, Muscatine co., Ia., on Mississippi River, 50 mi. below Davenport. Railroads: C. R. I. & P. and B. C. R. & N. Industries include saw and planing mills, sash and door factories, terra cotta factories, potteries, flour mills, brick works, etc. Exports: melons, sweet potatoes, and garden produce. Pop. 1900, 14,073.

Muses, in the Greek mythology the daughters of Zeus and Mnemosynē, who were, according to the earliest writers, the inspiring goddesses of song, and according to later ideas divinities presiding over the different kinds of poetry, and over the sciences and arts. Their original number appears to have been three, but afterward they are always spoken of as nine in number, viz.: *Clio,* the muse of history; *Euterpē,* the muse of lyric poetry; *Thalīa.* the muse of comedy, and of merry or idyllic poetry; *Melpomĕnē,* the muse of tragedy; *Terpsichŏrē,* the muse of choral dance and song; *Erăto,* the muse of erotic poetry and mimicry; *Polymnia* or *Polhymnia,* the muse of the sublime hymn; *Urania,* the muse of astronomy; and *Calliŏpē,* the muse of epic poetry.

Mushrooms, the common name for numerous species of fungi (which see), many of which are edible. Mushrooms are found in all parts of the world and most species are of a very rapid growth. Certain classes are commonly known as toadstools and puffballs. While many varieties are edible, many are deadly poisonous. In some countries, mushrooms have become staple articles of food, and the natives of Terre del Fuego and of Australia are said to live almost entirely upon them.

A typical mushroom has the following parts:

the cap, gills, ring and stem. The cap is the expanded top, frequently umbrella-shaped; the gills are the thin plates on the under side of the cap and usually extending from the stem to its circumference. They bear the spores by which the mushroom is propagated. The ring is a growth around the stem just below the gills and is formed of the part of the covering of the cap, left when the mushroom expanded into its perfect form. The stem may be wanting altogether, as in case of puff balls, or it may be short and thick or long and slender. The cap also takes a great variety of forms, as shown by the illustrations in the plate. In young plants of some species the cap before breaking away from the ring resembles a button, hence growing mushrooms are often said to be in the "button stage." Mushrooms take a great variety of colors, ranging from pure white to the most brilliant of rainbow tints, and in some species several colors blend. (See the *peziza*, *fly*, and *polyporus* in the plate.) Some species growing on the trunks of trees become hardened with age, one of these forms the well-known touchwood or punk, which has the property of being luminous in the dark. Edible mushrooms are cultivated for market in the United States and many of the European countries. They thrive best in a moist atmosphere with exclusion of bright sunlight. Gardeners usually grow them in beds of soil mixed with decaying horse manure and containing a quantity of the spores. The beds are long and narrow and are usually covered to protect them from the sun. The industry is very profitable when successful. As an article of food these mushrooms contain but little nutrition, and are regarded as a delicacy rather than a staple. Of the species illustrated in the plate, the *golden peziza*, *clavaria formosa* and *polyporus* are edible; the *russulus* acts as an emetic and the *fly* mushroom is extremely poisonous.

Since it is difficult for those not thoroughly familiar with the species to distinguish between poisonous and edible mushrooms, these plants should never be eaten unless selected by someone whose knowledge can be relied upon.

Music, any succession of sounds so modulated as to please the ear; also the art of producing such melodious and harmonious sounds, and the science which treats of their properties, dependencies, and relations. Sound is conveyed through elastic media, as the atmosphere or water, by undulations, which may be generated in the medium itself, as by a flute or organ-pipe, or transmitted to it by the vibrations of violin or pianoforte strings or the reeds of a wind-instrument. When the vibrations are fewer than 16 in a second or more than 8,192 the sound ceases to have a musical character. The *pitch* or relative height of a tone is determined by the number of vibrations in a given time, the lower numbers giving the grave or deep tones, the higher numbers the acute or shrill tones. The loudness of a tone is determined by the largeness of the vibrations, not their number. The note or musical sound called middle C on the pianoforte is usually assumed by theorists to be produced by 512 vibrations per second, and this was long the pitch recognized in practise as the standard or *concert pitch* useful for the guidance of all musicians.

The scale may be extended up or down so long as the sounds continue to be musical. In order to allow reference to be made to the various degrees of scales without reference to the key in which they are pitched the tones composing the octave are known in their ascending order as 1, *tonic* or keynote; 2, *supertonic;* 3, *mediant;* 4, *subdominant;* 5, *dominant;* 6, *superdominant* or *submediant;* 7, *leading note* or *subtonic;* 8, *final note.* The tonic, the subdominant, and the dominant are the governing or emphatic notes of the scale. In the diatonic scale the various notes proceed from the keynote by five *tones* and two *semitones;* the semitones (the smallest intervals recognized in musical notation) occurring between the 3d and 4th and 7th and 8th notes in the scale. A note produced by double the number of vibrations required to produce any given note will be found to be in perfect *unison* with it though higher in pitch. Between two such notes there is a gradation by several intervals in the pitch of tone, more agreeable than any other, the whole forming a complete scale of music called the *diatonic scale.* The space between the notes sounding in unison is termed an *octave*, and the note completing the octave may become the *keynote* of a similar succession of seven notes, each an octave higher or double the pitch of the corresponding note in the first scale. These seven notes of the diatonic scale are designated by the first seven letters of the alphabet, and each note bears a fixed ratio to the keynote in respect of pitch as determined by the number of vibrations. Thus in the case of a keynote obtained from a vibrating string, its octave is produced by halving the string, which vibrates twice as fast in a given time as the whole string, and the other notes may be obtained by applying reciprocally the ratios given below to the length of the string.

Every sound employed in the art of music is represented by characters called notes on a *staff*—that is, five equidistant horizontal lines on or between which the notes are placed. A note represents a higher or a lower sound according as it is placed higher or lower on the staff. When any note is higher or lower in pitch than can be placed upon the staff short lines called *ledger lines* are added above or below the staff to indicate the relation of the note to those on the staff. As, however, the multiplication of ledger lines is liable to become embarrassing to the eye, musicians have endeavored to overcome the difficulty by the use of more than one staff. The staves are the *bass*, *mean*, and the *treble*, but the second is now seldom used.

It will be seen that the steps in every diatonic scale must correspond to those of the scale of C, in that the notes composing it stand in the same fixed ratio to the keynote of the scale. In selecting another keynote than C,

however, it is necessary to modify some of the natural notes by the insertion of what are called *sharps* or *flats* in order to preserve the required relation and sequence of the intervals (the tones and semitones in their due relative positions) and so produce the major musical progression. The sharp (♯) placed before a note raises the pitch by a semitone, the flat (♭) lowers it by a semitone. A sharp or flat placed at the beginning of a staff affects every note upon the line which it dominates, unless the contrary be indicated by the sign of the *natural* (♮), which restores the note to which it is attached to its normal pitch. In the model diatonic scale given it has been pointed out that there is an interval of a tone between every note, except the 3d and 4th (E and F) and 7th and 8th (B and C), when the interval consists of a semitone. Now if we wish to make G the keynote it is clear that without some contrivance the notation of the scale from G to its octave would throw one of the semitones out of its place—namely, that between E and F, which instead of being, as it ought to be, between the seventh and eighth, is between the sixth and seventh. It is obvious then that if we raise the F a semitone we shall restore the interval of the semitone to a position similar to that which it held in the key of C. If D be taken as a keynote we shall find it necessary to sharp the C as well as the F in order to bring the semitones into their proper places. Still proceeding by fifths, and taking A as a keynote, a third sharp is wanted to raise G. We may proceed thus till we reach the scale of C sharp, with seven sharps, which is, however, rarely used. This series of scales with sharps is obtained by taking the dominant, first of the model scale as the keynote and then of the others in succession, and sharping the fourth of the original scales to make it the seventh of the new. Another series is obtained by taking the subdominant of the model scale as the keynote and lowering its seventh a semitone, making it the fourth of the new scale, or scale of F. Taking the subdominant of the scale (B) as the keynote we require to flat the E in addition to the B, and so on until we have lowered all the tones in the scale a semitone. Besides the forms of the diatonic scale, which has an interval of two tones between the tonic and the third, and is called the *major scale*, there are *minor scales* of which the most important kind has an interval of a tone and semitone between its tonic and third, the seventh note being sharped so as to form a leading note. In the ascending scale, too, the harsh interval of the second between this leading note and the one immediately below it is frequently avoided by sharping the lower note. In the descending scale the sharps are removed, and the scale is identical with the major, beginning at its sixth and descending an octave. Major and minor scales which, like those given in the example, have the same key signature, are called *relative*. Thus, the major scale of G has for its relative minor the scale of E minor: the major scale of D has for its relative minor the scale of B minor; and so on. Each minor scale is also called the tonic minor to the major scale on the same keynote. The tonic minor scale to C major is C minor. One major scale is also said to be related to another when it is raised from its dominant or its subdominant; thus the scale of G and F are held to be nearly related to that of C. There is still another kind of scale, called the *chromatic*, because, like colors in painting, it embellishes the diatonic by its semitones. It consists of thirteen notes, and usually ascends by sharps and descends by flats. Intervals in music (i. e., the distance from any one note to any other) are reckoned always upward and inclusively by the number of names of notes they contain, both limits to the interval being counted. Thus C to E is a third, both C and E being counted in the interval. They are known as major or normal when they are such as would be found in any major scale; as minor when the interval consists of a semitone less than the corresponding major interval; as augmented when consisting of a semitone more than major; as diminished when a semitone less than minor; and as simple or compound according as they fall within or exceed the compass of an octave.

Hitherto notes have been referred to only as representatives of the various sounds with reference to their pitch and distances from each other; but each note serves also to mark the relative duration of the sound it represents. The stems of the notes may be written upward or downward as convenient. In connection with these notes other signs are used still further to indicate duration. A dot placed after a note lengthens it by one half, two dots by three fourths. Instead of the dot a note of its value may be written, and a curve, called a *tie*, written over it and the preceding note. Sometimes three notes of equal value have to be played in the time of two, in which case the figure 3 with a curve thrown over it is written above or below the notes. Two *triplets* (as this group is called) may be joined, and the figure 6 surmounted by a curve written over them; they are then performed in the time of four notes of the same form. A sensible interval of time often occurs between the sounding of two notes; this is represented by characters called *rests*, each note having a corresponding rest. A dot may be added to a rest in the same manner as to a note, to indicate an addition of a half to its length. Every piece of music is divided into portions equal in time, called *measures*, which are separated from each other by vertical lines called *bars*. The term bar is often loosely applied to the measure as well as to the line. The exact length of the measure is indicated by a sign at the beginning of the piece of music. In common time, indicated by a 𝄵 written after the clef, each measure contains a semibreve, or such notes and rests as make up together its value. Another form of common time, marked with a 𝄴, contains two semibreves in the measure, or their equivalents in minims, crotchets, etc. Another method of indicating time (or rather more cor-

Music

rectly, rhythm) is by figures, in the form of a fraction. The figures of the denominator are either 2, 4, 8, or 16, which (the semibreve being considered the unit) stand for minims, crotchets, quavers, and semiquavers respectively; and the numerator shows the number of these fractional parts of a semibreve in the measure. Besides common time, which may be indicated in two ways, there is triple time, in which a measure is made up of three minims, crotchets, or quavers, which can only be marked by figures; these are $\frac{3}{2}$, $\frac{3}{4}$, or $\frac{3}{8}$. When two or four measures of triple time are united in one measure the music is said to be written in compound common time, and is indicated by the fractions $\frac{6}{4}$ and $\frac{6}{8}$; rarer examples of compound time signatures are $\frac{9}{4}$, $\frac{9}{8}$, $\frac{9}{16}$, $\frac{12}{8}$, etc. The object of the division of musical passages into measures is to indicate their rhythm. Notes, like words or syllables, are *accented* or *unaccented*. The strongest accent is given to the first note of a measure. In common time of four notes to the measure, the third has a subordinate accent, as, though in a less degree, the third measure note in triple time. In compound common time the subordinate accents fall on the first note of the last half of the measure, and in compound triple time on the first note of each of the groups of three of which the measure is composed. When a curve is placed over two notes in the same degree but not in the same bar, the two notes are played as one of the length of both, and the first note acquires the accent. This displacement of the accent is called *syncopation*. If the curve is written over notes of different degrees it is called a *slur*, and indicates that the notes are to be played or sung smoothly, as if gliding into each other. When an opposite effect is wanted, that is, when the notes are to be produced distinct and detached (*stacatto*), a dot is placed over them. The various degrees of loudness and softness which occur in a piece of music are indicated by such Italian words as *forte*, loud; *fortissimo*, very loud; *piano*, soft; *pianissimo*, very soft. In order to save time in writing music various abbreviations are used.

Melody is a peculiar succession of sounds in a single part, and is produced by the voice or by an instrument. A melody generally consists of an even number of phrases: this number may be four, eight, twelve, or sixteen. A phrase generally corresponds with a line in a verse of poetry. In order to produce an agreeable variety a melody may pass from the form of the scale in which it started to another, generally to the one most nearly related to it, that of the dominant or subdominant. This change from one key to another is called *modulation*. Except in very rare cases a melody ends on its keynote. When two sounds heard together are agreeable to the ear they are called *concordant*, or are said to form a *concord;* if, on the contrary, they grate upon the ear they are said to be *discordant*, or to form a *discord*. Concords are of two kinds—perfect and imperfect. The perfect are the minor fourth, the perfect fifth, and the octave; the imperfect are the major and minor third, and the major and minor sixth. A perfect concord is so called because its conterminate sounds cannot be raised or depressed without becoming discordant. If three or more sounds be heard at the same time the combination is called a *chord*. When a chord is composed of concords only, or in other words when it is composed of a fundamental sound accompanied by its third (major or minor) and its fifth, it is termed a common chord. Of discords the most simple is the minor seventh, or, as it is usually called, the dominant seventh.

History.—The first public use of music by every people has been in religious rites and ceremonies. The music of the Hebrew worship was of an elaborate character, and was probably derived from Egpyt. To the Egyptian priests the Greeks seem also to have owed their ideas of music. It is confidently asserted by some that the Greeks were acquainted with harmony in the technical and musical sense of the word; that the notes A B C D E F G, produced by touching the white keys of the pianoforte, form the common Greek scale; and that their arrangement was copied from the keys of organs, which were derived by us from the Romans through the Greeks, and by the Greeks and Romans from ancient Egypt. The Romans derived all their public music from the Etruscans, and the art was for a long period confined to sacred uses. St. Ambrose (elected archbishop of Milan, 374) may be regarded as the father of the music of the Western Church, as he not only composed and adapted music to the different portions of the church service, but determined the musical idiom in which it was to be cast by selecting a set of simple scales from the exceedingly complicated system of the Greeks. His reputation has, however, been somewhat obscured by the next great musical reformer, Gregory the Great, whose epoch is fully two centuries nearer our own. During this long period the institutions of Ambrose fell into utter confusion, and Gregory, in attempting to restore order, found it necessary to supplement the Ambrosian scales, then first designated *authentic*, by four other subordinate or collateral scales called *plagal*. During the four centuries which connect the epoch of Gregory with that of Guido Aretino only two names are worthy of mention—that of Isidore, archbishop of Seville, in whose *Sententiæ de Musica* we meet, for the first time at least among Christian writers, with the mention of harmony in the modern sense of the term; and that of Hucbald, a monk of St. Armand, Tournay (d. 932), who not only mentions harmony, but gives examples of the harmony of his age, *diaphony* or *organum*. The greatest name, however, of the early Middle Ages is that of Guido Aretino (d. 1050). The names which he gave to the notes, *Ut* (for *Do*), *Re*, *Mi*, *Fa*, *Sol*, *La*, are universally used to this day. *Si* was afterward added by a musician named Le Maire. Within fifty years after the death of Guido a new form of musical art made its appearance, the characteristic of which was the combination of sounds of unequal lengths—music in which two or more

sounds succeed one another, while one equal to them in length was sustained. This was called *discantus* or descant. Descant, it is obvious, would argue the existence of some system of musical proportion among sounds of different duration, and written descant, some means of distinguishing such sounds from one another. As might be expected, we hear of both inventions about the same time, the middle of the twelfth century, when the treatise on the *Cantus Mensurabilis* of Franco of Cologne was written, when notes appear first to have been used, and signs to represent the raising and depressing of individual sounds (flats and sharps) first came into being.

Late in the thirteenth century we hear of Adam de la Hale, the Hunchback of Arras as he was called (b. in 1240), the composer of several three-part songs, and also of the first comic opera, *Li Gieus de Robin et de Marion.* The beginning of the next century furnishes us with a remarkable evidence of musical advancement in the word *contrapunctum* (point against point, or as we now say, note against note). This word was first used in the works of Jean de Muris, the greatest theorist of the fourteenth century. The middle of the century gives us the first example of four-part music in a mass performed at the coronation of Charles V of France (1360) and composed by Guillaume de Machault. By this time the organ had reached some degree of mechanical perfection, and several Belgian musicians visiting Rome in the last years of the fourteenth century carried with them the first masses that had ever been seen there in written counterpoint. In the list of these singers (1380) we find the name of Dufay, whose compositions, though harsh in places to our modern ears, are far superior in design and clearness of texture to anything known to be produced by his predecessors. But the works of Dufay and his contemporaries have been cast into the shade by those of a later generation, of the masters of the new Belgian school, Ockenheim, his contemporaries, and pupils. Canon, fugue, and imitation, practised by Dufay, were greatly improved by Ockenheim, among whose pupils was Josquin Deprès, or Des Prez (d. 1521). The works of the latter drove those of every other composer from the churches of the Continent, and he was scarcely less successful in productions of a lighter class. His pupils and countrymen were to be found in every court and important city of the Continent, among the musical schools founded by them being those of Naples and Venice. The Italians, however, soon advanced beyond the limits of the art as taught by the Belgians. Constanzo Festa, whose *Te Deum* has been sung on the election of every pope since his time, was one of the creators of the madrigal; and Giovanni Animuccia is of special interest from his connection with St. Filippo de Neri, to which may be traced the origin of the oratorio.

The first Roman school was founded by Claude Gondimel (1510–72), among whose pupils was the greatest composer the world had yet seen, Giovanni Pierluigi Palestrina (1524–94). Musical learning had by this time done its utmost. Every kind of contrapuntal artifice had been brought into play, but no attempt was made to bring out the meaning of the words, and this evil, in conjunction with the frequent use of secular melodies, came under the censure, first of the Council of Basel, and then of the Council of Trent. The committee appointed to carry out the decrees of the latter sought the aid of Palestrina, and his three masses, more particularly the third, the Missa Papæ Marcelli, at once saved music to the church, and established a type which is still recognized. At this period great musical skill and knowledge extended over every part of civilized Europe, the Italians being now, as the Belgians had been before, its chief masters and interpreters, except in England, which in this sixteenth century had a strictly national school comprising Tallis, Byrd, Farrant, Morley, Ward, Bull, Dowland, and last and greatest, Orlando Gibbons. The close of the century witnessed the birth of the *Opera seria.* Some faint approaches had been made in this direction before, but about the year 1580 a number of amateurs living in Florence, including Bards, Corsi, Strozzi, Galileo (the father of the astronomer), and others, formed themselves into a society for promoting the closer union of poetry and music by reviving the musical declamation of the Greeks. Their attempts, however, were soon surpassed by the works of Claudio Monteverde, whose Orfeo opened up a new musical world. The first to profit by his discoveries was an artist b. some twenty years later, Carissimi, the first great master of the sacred cantata in its various forms. He is said to have been the teacher of Alessandro Scarlatti, the founder of the Neapolitan school. With this school begins modern musical practise; better methods of fingering the keyed instruments, and of bowing the stringed instruments, not to speak of improvements in the instruments themselves; and above all these in importance and difficulty, the art of singing. The history of the French school proper begins late in the seventeenth century, with J. B. Lully (b. 1633), the composer of many operas, ballads, and occasional pieces, and also of some church music. His music never had great popularity beyond France, but the influence of his example was extensive, and showed itself to some extent in Wise and Blow, and their immediate successors in the English Chapel Royal, the most distinguished of whom was Henry Purcell, the type of English composers. After him Arne, Croft, and Green acquired a certain reputation, but an entirely new era was opened by the advent of Handel, who may be said to belong to England rather than Germany. From about the middle of the last century, when the career of J. Sebastian Bach ended, Germany has indisputably held the highest place in music. Gluck, Haydn, Mozart, Emmanuel Bach, and many others, before and after, owe much of the sweetness, which they united with German strength, to their study of the Italian

masters. But in Beethoven, Weber, Spohr, and Mendelssohn the traces of southern influence are hidden, and new emotional and poetic elements begin to find their way into music. Much, too, as the French musical drama owed in its origin to the Italians, its consolidation was the work of the Germans. Springing up with Lully, a Florentine, carried a step forward by Rameau, a Frenchman, it was subsequently immensely developed by Gluck and Meyerbeer (Germans), by Cherubini and Rossini (Italians), and by Méhul, Boieldieu, Hérold, and Auber (Frenchmen). Against the best works of the German masters, those of the purely sensuous Italian school, represented by Donizetti, Bellini, and Verdi, have striven with some success for popularity; but the tide of victory seems fairly turned away from the south, and the last-named composer in his later works has shown the force of the German influence. Of the later German school, claiming as its starting point Beethoven's *Ninth Symphony*, in which poetry and music form a perfect whole, the chief exponents have been Wagner and Liszt, though with these, as manifesting more or less the same tendencies, must be cited the names of Schubert, Schumann, Mendelssohn, Berlioz, Chopin, and Franz. Opinions may differ as to the extent to which this new development anticipates "the music of the future," but there can be no doubt as to the beauty and impressiveness of much of the work of these so-called "tone poets." Among later and living composers may be noted the names of Gounod in France, Rubenstein and Brahms in Germany, Dvorak in Bohemia, Boito in Italy, Grieg in Scandinavia, and Sullivan, Mackenzie, Stanford, and M'Cunn in Britain. All have given proof of power and originality, but it cannot be said that any of them stands in the first rank of composers.

Musk, a substance used in perfumery and medicine, and obtained from several species of deer. A perfume of similar character is also obtained from one or two other animals; and various animals and plants are noted for emitting a strong musky smell.

Musk Deer, a genus of deer, forming the type of the family Moschidæ, which is essentially distinct from the family of the Cervidæ, or true deers. Their chief habitat is Asia and the islands of the Eastern Archipelago; though one species is found on the West Coast of Africa. These animals attain the size of a young roe-deer, and the upper jaw bears prominent, canine teeth. The males alone yield the *musk*, which is secreted by an abdominal gland of about the size of a hen's egg. The Thibet musk is most in repute, that known as Russian or Siberian being inferior in quality. Besides its familiar use as a scent, musk is employed medicinally as an antispasmodic.

Muskegon, Muskegon co., Mich., on Muskegon River, near Lake Michigan. Railroads: C. & W. M.; G. R. & I.; T. S. & M. Has best harbor on east shore of Lake Michigan. Is one of the most important lumber manufacturing cities in the world. Industries include planing and rolling mills, machine shops, foundries, furniture, piano, refrigerator factories, etc. It is the center of a fruit and vegetable producing district. Pop. 1900, 20,818.

Musket, a hand gun with which infantry soldiers were formerly armed. When first introduced, early in the sixteenth century, as a development of the culverin and arquebus, it was discharged by means of a lighted match, and was so heavy that it had to be laid across a staff or *rest* to be fired. The wheel lock followed, the chief feature of which was a wheel made to revolve by means of a spring, and to cause sparks by friction against a flint. The next improvement was the flintlock proper, in which sparks were produced by one impact of a piece of flint on the steel above the priming powder. Musketeers were soon introduced into all armies, and in the beginning of the seventeenth century infantry consisted of pikemen and musketeers, and all changes in regard to the relative proportion of the two arms were always in favor of the latter. The flintlock musket was introduced into the British army toward the end of the seventeenth century, and was the British musket of the days of the Peninsular War and Waterloo, known familiarly as "Brown Bess." It was superseded by the percussion musket in 1842, this musket being in turn superseded by the rifle.

Muskingum, a river in the state of Ohio, falling into the Ohio River at Marietta. It is connected with Lake Erie by canal.

Musk Ox, an animal intermediate between the ox and sheep. Resembling in general appearance a large goat-like sheep, its body is covered with a coat of tufted hair, brownish in color and of great length. The hair about the neck and shoulders is so thick as to give

Musk Ox.

the animal a "humped" appearance; on the rest of the body it is very long, smooth, and flowing, while interspersed among its fibers is a layer of lighter-colored wool. The musk ox is active and agile, and climbs mountainous places with ease and dexterity. The horns, broad at the base, and covering the forehead and crown, curve downward between the eye and the ear, and then upward and slightly backward. The horns of the female are smaller than those of the male, and their bases do not touch. The ears are short, the head large and broad, the muzzle blunted. The average size

of the male is that of a small domestic ox. Gregarious in habits, each herd numbers from twenty to thirty members. The female brings forth one calf in May or June. The food consists of grass, lichens, etc. The musk ox inhabits the Arctic regions of America north of the 60th degree of latitude. The flesh is pleasant to the taste, though it smells strongly of musk, the odor of which is also diffused from the living animal.

Muskrat, an American rodent allied to the beaver, and the only known species of the genus. It is about the size of a small rabbit, and has a flattened, lanceolate tail, covered with small scales and a few scattered hairs. Its toes are separate, and provided with a stiff fringe of hair. In summer it has a smell of

Muskrat of Southern Europe.

musk, which it loses in winter. The odor is due to a whitish fluid deposited in certain glands near the origin of the tail. Of considerable commercial importance on account of its fur, the muskrat, or *musquash* as it is popularly called, from its Indian name, is taken in large quantities. Very common in North America, the muskrat lives along the margins of streams, in the banks of which it makes its nest.

Muslin, a fine, thin, cotton fabric, first made at Mosul or Moussul (whence the name), afterward in India, and first imported into England about 1670. About twenty years afterward it was manufactured in considerable quantities both in France and Britain, and there are now many different kinds made, as *book, mull, jaconet, leno, foundation,* etc. Some Indian muslins are of extraordinary fineness, but they can all be rivaled in Europe.

Mussel, a term popularly given to several lamellibranchiate mollusks, section Asiphonida, or those in which "siphons," or tubes admitting water to the gills, are absent. The common mussel forms a typical example of the family Mytilidæ, the shells of which family are equivalve, and have a hinge destitute of teeth. It has a "beard," and is the same as the salt water mussel of New England. In some districts it is used as an article of food, the best mussels approaching nearly to the oyster in flavor, though occasionally found to be unwholesome.

Musset (mü-sā), Louis Charles Alfred de (1810–1857), French poet, novelist, and dramatist, b. at Paris. After trying various professions he gave himself up wholly to literature, and in 1829 published a volume of poems which had an immediate and striking success. De Musset was one of the most distinctive, and in a certain sense, original of modern French writers.

Mustang, a small wild horse of the Southwestern U. S. and Northern Mexico, where it is found in extensive herds, and is captured and tamed as the Indian pony. A reversion from the domesticated stock, it seldom exceeds 13 hands in height, but is a strong and useful animal, and capable of great endurance.

Mustard, the common name of plants of the genus *Sināpis,* nat. order Cruciferæ. The seeds of the white and common mustard, when ground and freed from husks, form the well-known condiment of the shops. The plant is an annual, with stems 3 to 4 ft. in height, lower leaves lyrate, upper lanceolate and entire, flowers small and yellow.

Muta Nzige, a large African lake, southwest of and formerly supposed to be part of the Albert Nyanza. It lies immediately under the equator. The island of Usongora occupies a large space in the northern part of the lake, the equator passing through its center. It is drained by the river Semliki, which enters the Albert Nyanza, as recently discovered by Stanley, who has proposed to give the name Albert Edward Nyanza to the lake.

Mutsuhito (1853 ——), the Mikado or Emperor of Japan, the one hundred and twenty-second lineal descendant in unbroken succession of the dynasty founded by Jimmu, extending through 2,564 years. He ascended the throne in 1867 and inaugurated a liberal reform policy, including the adoption of a constitution.

Muttra, a town in India, Northwest Province, on the Jumna, 36 mi. n.w. of Agra. It is an old Hindu city, one of the most artistic and interesting in India, and being regarded as the birthplace of Krishna, is a great center of Hindu devotion and place of pilgrimage. Pop. 57,724. The Muttra district has an area of 1,453 sq. mi.; pop. 671,690.

Muzo, a village of Colombia, South America, northwest of Bógota, noted for its rich mine of emeralds.

Myce′næ, an ancient city of Argolis, in the Peloponnesus, about 6 mi. n.e. of Argos. It is said to have been founded by Perseus, and before the Trojan War to have been the residence of Agamemnon, in whose reign it was regarded as the leading city in Greece. Its ruins are extremely interesting from their antiquity and grandeur. Among them are the Lion's Gate, and the vaulted building of enormous stones called the *Treasury of Atreus,* etc. Dr. Schliemann has carried out excavations here with valuable and interesting results.

Myconi, an island in the Grecian Archipelago, one of the Cyclades, about 21 mi. in circuit. The inhabitants are chiefly employed in seafaring pursuits. The capital, Mycŏni, a seaport, contains about 3,400 inhabitants. The island produces barley, raisins, and figs, with some wine. Pop. 4,466.

Myr′midons, an ancient Greek people of Thessaly, who accompanied Achilles to the Trojan War. They are said to have emigrated into Thessaly under the leadership of Peleus.

The term has come to signify the followers of a daring and unscrupulous leader, or the harsh and unfeeling agents of a tyrannical power.

Myrrh is the name given to a gum resin which exudes from a shrub growing in Arabia and Abyssinia. It was much esteemed as an unguent and perfume by the ancients, who used it also for embalming and for incense. It is still used as a perfume and for incense, as also medicinally. By distillation with water myrrh yields a viscid, brownish-green, volatile oil. Myrrh of the best quality is known as Turkey myrrh; that of an inferior kind goes under the name of East Indian, being exported from Bombay.

Myrrh.

Myrtle, a genus of plants, consisting of aromatic trees or shrubs, with simple opposite leaves sprinkled with pellucid glandular points,

Myrtle; *a*.—branch in flower; *b*.—section of flower.

and having axillary or terminal white or rose-colored flowers. One species, the common myrtle, is a native of the south of Europe and other countries bordering on the Mediterranean. It has been celebrated from remote antiquity on account of its fragrance and the beauty of its evergreen foliage, and by different nations was consecrated to various religious purposes. The brows of bloodless victors were adorned with myrtle wreaths, and at Athens it was an emblem of civic authority. With the moderns it has always been a favorite ornamental plant. It flourishes in the open air only in warm countries.

Mysole (mī-sōl′), an island in the Indian Archipelago, between Ceram and the northwest extremity of New Guinea. It is about 50 mi. long by 15 mi. broad, and is inhabited by immigrant Malays and by Papuans. Trepang, ambergris, birds of paradise, pearls, etc., are exported.

Mysor′ (or Mysore′), a principality of Southern India; area 27,936 sq. mi. It is enclosed east and west by the Eastern and Western Ghauts, and on the south by the Nilgiri Hills, and consists of table-lands about 2,000 ft. above the level of the sea. The only river of importance is the Kaveri. There are many large tanks and artificial reservoirs used for irrigation, and the soil produces all the grains and vegetables of the other parts of India and many of the fruits of Europe. Coffee and silk are largely produced, and there are valuable forests. Silk and cotton manufactures are carried on, and there are manufactures of cutlery, copper vessels, and gold and silver lace. Mysor is the capital. The revenue and expenditure of the principality are somewhat over $5,000,000. Pop. 4,943,604.

Mysor, the capital of the state of the same name, 250 mi. w. by s. of Madras, stands at an elevation of 2,450 ft. above the level of the sea. The streets are regular, and the houses intermingled with trees and temples. It contains the rajah's palace and the dwellings of the principal merchants and bankers, and other private edifices. To the south of the fort and about 5 mi. from the city is Mysor Hill, on the summit of which is the British residency. Pop. 74,048.

Mysteries, among the ancient Greeks, and afterward also among the Romans, secret religious assemblies which no uninitiated person was permitted to approach. They originated at a very early period, and seem to have had a double object — first, that of handing down the traditions relating to the divinities in whose honor they were celebrated; and secondly, that of teaching and practising religious rites. The most important Greek mysteries were—1, The Elusinian. See *Eleusis.* 2, The Samothracian, celebrated in honor of the Cabiri. See *Cabiri.* 3, The Dionysia, which were celebrated in honor of Bacchus or Dionysus. These were of so licentious a character that they were latterly forbidden as prejudicial to the public peace and morals. This was likewise done in Italy by a decree of the Roman senate in 166 B. C. 4, The Orphic, founded by some who called themselves followers of Orpheus.

Mysteries, a kind of rude dramas which were a favorite spectacle in the Middle Ages, represented at solemn festivals. The subjects were of a religious character, and the eccles

astics were at first the performers and authors, the performance being in church. Such plays were called *mysteries* because they taught the mysterious doctrines of Christianity, and the mysteries proper represented scenes from Scripture history, being thus distinct from the *miracle* plays, which dealt with lives of saints, though the distinction is not always attended to. These plays were usually exhibited in a connected series by the guilds or trades of a town. They sometimes took several days to perform. Thus we hear of one which lasted eight days, and contained the greater part of the Scripture history, begining with the creation and ending with the judgment day. The *Passion of Christ*, the *Slaughter of the Innocents*, etc., were among the subjects represented, the first perhaps more frequently than any other. Corpus Christi day was the chief occasion on which they were performed, and they continued from the twelfth to the sixteenth century. Such plays are still performed at various places in Roman Catholic countries. The passion play performed at the village of Ober-Ammergau, in Bavaria, every ten years, is a play of this kind. The mysteries were superseded by the moralities (which see).

Mys'ticism, a word of very vague signification, applied sometimes to views or tendencies in religion which aspire toward a more direct communication between man and his Maker through the inward perception of the mind, than that which is afforded through revelation, or to effects and inclinations by some special and extraordinary means to hold intercourse with divine powers or the inhabitants of higher worlds. According to John Stuart Mill, "whether in the Vedas, in the Platonists, or in the Hegelians, *mysticism* is neither more nor less than ascribing objective existence to the subjective creations of our own faculties, to ideas or feelings of the mind, and believing that, by watching and contemplating these ideas of its own making, it can read in them what takes place in the world without." The tendency toward mysticism seems naturally implanted in some natures, and has been observed in all ages. It is a characteristic feature of the great Asiatic religions, Brahmanism and Buddhism. In the Neo-Platonic philosophy it is an important element as represented by Plotinus (204–269 A.D.). Christianity, in consequence of its special tendency to practical good, as well as of its submission to a system of doctrine expressly revealed, would seem to have afforded little scope for the extravagances of mysticism. It soon, however, made its appearance, forming a kind of profane mixture, and reached its extreme in the writings of the so-called Dionysius the Areopagite. This pseudo-Dionysius obtained an extensive influence, especially through Hugo St. Victor in the twelfth century, and was everywhere held in high respect until the time of the Reformation. In opposition to scholasticism, which labored in the construction of a systematic and almost demonstrative theology, this system embodied a theology of feeling and immediate illumination, which attached very little importance to intellectual effort, and laid so much the more weight on purification of heart and ascetic morality. Of the most notable of the German mystics in the Middle Ages were Eckhart and Tauler. In the philosophy of the fifteenth and sixteenth centuries, in Paracelsus, Bruno, and others, mysticism took a direction which at a later period gave rise, on the one side to the alchemists and Rosicrucians, and on the other side to a number of religious sects, of which such men as Jacob Böhmen and Swedenborg may be considered the representatives. The Quietism of Madame Guyon and her adherents in France in the eighteenth century was a product of the same nature.

Mythology, the collective name for the whole body of fables, legends, or traditions (myths) that take their rise at an early period of a nation's existence and of its civilization, and that embody the convictions of the people among whom such fables arise as to their gods or other divine personages, their origin and early history and the heroes connected with it, the origin of the world, etc. Such fabulous narratives seem to grow up naturally among all early peoples, and are found among the ruder races at the present day; but the mythologies which have been most studied, and the tales belonging to which are best known, are those of ancient Greece and Rome, Scandinavia, the Hindus, and ancient Egypt. Though speculations as to the origin of mythology have been put forth from a very early period, it is only in recent times by the help of comparative philology, and by comparing together the myths of different peoples (comparative mythology), that any real advance has been made. Myths are of course believed in by the bulk of the people among whom they are current, and it is only when speculative and reflective spirits arise, and when science and philosophy have made some advances, that their truth is called in question. Thus Zeus, Apollo, Athēnē, Hercules, and the other divinities of ancient Greece, were believed by the bulk of the people to have a real existence, and the stories regarding them were looked upon as true: but even in Greece in early times the absurdities and monstrosities of some of the myths attracted the attention of philosophers, and led to attempts at explaining the stories in such a way that they should not shock common sense or moral feeling. In doing this three chief systems of interpretation were followed, called respectively by Max Müller, the *ethical*, the *physical*, and the *historical*. Those who adopted the first explained that the stories of the power and omniscience of the gods, of their rewarding good and punishing evil, were invented by wise men for the purpose of maintaining law and order in communities—leaving it to be supposed that the immoral representations of the gods were the inventions of poets. The interpreters of the physical school held that the myths contained explanations of natural phenomena, or of certain views regarding them, under a peculiar phraseology, which disclosed its hidden wisdom when

rightly understood. The third or historical school, identified with the name of Euhemerus, represented the gods as having been originally kings or chiefs, great warriors, sages, or benefactors of the human race, who, being exalted above their fellow men in life, after their death gradually came to be looked upon as deities.

Perhaps the most common theory of mythology at the present day is one that is based upon comparative philology, and on a comparison of the myths of the different Indo-European nations. It maintains that all myths have their origin in physical phenomena; but it differs from the older physical or allegorical school in explaining myths as an unconscious product of the popular mind, whereas an allegory is a conscious product of some individual mind. The exponents of this school tell us that in order to understand how myths grow up naturally we must carry our thoughts backward to an early stage of language and civilization, when men have little or no real knowledge of the external world, when they use themselves as the gauge of all phenomena, and endow every object of sense with a conscious life similar to their own, applying to inanimate objects the language which they use when speaking of their own feelings or actions. Thus in early times men would speak quite naturally of the sun as the child of the night, as the destroyer of the darkness, as the lover of the dawn and as deserting her, as traveling over many lands, as the child of the morning, as her husband, as her destroyer, and so on. This language was natural in early times, and was perfectly understood as descriptive simply of natural phenomena, and nothing else; but in course of time such expressions lost their natural significance, and in this way it is explained that Phœbus Apollo, Endymion, and Phaëthon, for instance, all originally significant epithets applied to the sun from his brilliancy or other characteristic, became the names of divinities, who were regarded as quite distinct from each other. So Zeus originally meant the sky, Athēnē and Daphnē the dawn, Hermes the wind, and so on. According to this theory the story of Apollo slaying the children of Niobē with his arrows is nothing more than a mythological way of telling how the morning clouds are dispersed before the rays of the rising sun. Hercules, again, is the sun laboring throughout his life for the benefit of others; soon after birth he strangles the serpents of darkness, and after performing innumerable toils he dies on the funeral pyre, as the sun sinks in the fiery west. Endymion, as his name implies, is the setting sun, who is courted by the moon, and who sinks to sleep in the west. Some of these identifications of deities with natural phenomena are pretty certain. Zeus, for instance, the supreme god of Greece, the same as the Jupiter of the Romans and the Dyaus of the early Hindus, is clearly the bright sky; and among the Hindus the name of the sky-god Dyaus always retained its meaning of sky, so that Dyaus had only an indistinct personality as a deity. The Hindu Varuna, a sky-god, is clearly the same as the Greek Ouranos, which latter word, besides being the name of a deity, had the ordinary signification of sky or heaven. So the Scandinavian Thor, the god of thunder, can hardly be anything else than thunder personified. Yet as a whole the "solar theory" cannot be accepted as a key to all mythology. It fails to account for many of the wild and monstrous myths told of deities, of the creation of the world, of the state of the dead, etc., and though it may throw a certain amount of light on the mythology of the Aryan or Indo-European nations, is quite insufficient when myths as a whole are investigated. See *Northern Mythology*.

Another road has been taken, therefore, by some recent investigators. Thus, Andrew Lang finds a key to mythology in a study of the myths and mental habits of savage races; he maintains that "the savage and senseless element in mythology is for the most part a legacy from ancestors of the civilized races who were in an intellectual state not higher than that of Australians, Bushmen, Red Indians, the lower races of South America, and other worse than barbaric peoples," and that the monstrous myths current in Greece, Egypt, and India, were thus inherited. He points to the currency of such myths among savages at the present day,-and to the fact that in general, savages are eager to arrive at some explanation of the natural phenomena around them, and are quite satisfied with explanations that to civilized men may seem imbecile. When a phenomenon presents itself the savage requires an explanation, and that explanation he makes for himself, or receives from tradition, in the shape of a *myth*. But, indeed, no one theory can be expected to explain the origin of all myths; for it is impossible to deny that some may be pure products of imagination, tales invented by early bards or minstrels to beguile a weary hour, while in others fragments of real history may be hidden.

N

N, the fourteenth letter and eleventh consonant of the English alphabet; formed by placing the point of the tongue against the root of the upper teeth and forcing out the breath. It is classed as a nasal, a lingual and liquid or semi-vowel. In English and most other languages *n* has a pure nasal sound; in French and Portuguese, after a vowel in the same syllable, as *on, un,* etc., it has the effect of giving a semi-nasal sound to the vowel preceding, that is to say, the vowel is sounded by an emission of the breath partly through the nose and partly through the mouth. The Spanish alphabet has a character *ñ,* called *n* with the *tilde,* as in *España,* pronounced like *ni* in *onion, minion; gn* in Italian is pronounced in the same way.

Nábha (näb′h*a*), one of the Punjab native states, India. Area 863 sq. mi.; pop. 261,824. The chief town is Nábha; pop. 17,116.

Na′dir, in astronomy, that point of the heavens which is diametrically opposite to the zenith, or point directly over our heads. The zenith and nadir are the two poles of the horizon.

Nævus (or "Mother's Mark"), a disfigurement which occurs most frequently on the head and trunk, but may also appear on the extremities. It consists essentially of an enlargement of the minute veins, or venous capillaries, which are dilated, and anastomose or unite among themselves to form a vascular patch generally of a deep-red color. The familiar name of "mother's mark," or "longing mark," is applied from the popular belief that the lesion was the result of fear, fright, unnatural longing, or some such irritation acting upon the mother's constitution, and communicating its effects to the unborn child in the shape of this mark.

Naga Hills, a district of Assam. Area 6,400 sq. mi. It consists largely of unexplored mountain and jungle. The tribes are very unruly, and numerous outrages have called for the intervention of the British government. Pop. 94,380.

Nagasa′ki (or Nangasa′ki), a city and port in Japan, on the west coast of the island of Kiusiu, beautifully situated on a peninsula at the extremity of a harbor, affording excellent anchorage, and enclosed by hills, up the sides of which a portion of the town extends. Nagasaki was one of five Japanese ports opened in 1858 to the British and Americans, having been previously open to the Dutch; and in 1869 it and seven others were opened to foreign nations generally. The exports are copper, silk, camphor, tobacco, porcelain, lacquered wares, etc. A dry dock measuring 460 by 89 ft. was opened here in May, 1879. Pop. 39,566.

Nagina (*na*-gē′*na*), a town of Hindustan, in Bijnor district, Northwestern Provinces. It manufactures cloth, glassware, and gun barrels. It is noted also for its ebony carving. Pop. 20,503.

Nágpur (or Nagpore), a town in India, capital of the Central Provinces, and of the division of Nagpur (area 24,040 sq. mi.; pop. 2,758,056), 440 mi. e.n.e. of Bombay. The manufactures include cotton and woolen cloths, and utensils of copper, brass, and other alloys. A bed of coal, estimated to contain 17,000,000 tons, at a depth of 200 ft., has been discovered at Nagpur. There is a trade in opium, hemp, and above all, in cotton, for which this is a great mart.

Nahum, one of the twelve minor prophets, the author of a book of prophecies included in the Old Testament. His prophecies relate to the destruction of Nineveh, which he describes in vivid colors. The period in which he lived is, however, uncertain, probably 700–600 B. C.

Na′iadæ, a natural order of endogens, consisting of plants living in fresh or salt water in most parts of the world, having cellular leaves with parallel veins and inconspicuous hermaphrodite or unisexual flowers. The grass-wrack is the most familiar example.

Na′iads, in the Greek mythology, nymphs of fountains and brooks, of similar character to the dryads, oreads, etc., analogous to the nixies of the northern mythology.

Nails (of Animals), like hairs, are appendages which belong to the category of the exoskeletal elements of the animal frame, or as parts of the skin, of the outer layer of which they are modified appendages. A nail, in fact, is a specialized arrangement of the cells of the epidermis. In man the nails do not enclose the ends of the digits, but in the horse, and "hoofed" or ungulate quadrupeds generally, the nails assume the form of protective coverings to the digits, and are then known as "hoofs." Nails may be produced to form "claws," as in birds and carnivorous mammals, while in the sloths they assume a large relative size, and are used as a means in arboreal progression. In the Amphibia, as in some toads, efts, etc., the nails appear as mere thickenings of the skin at the extremities of the digits. The nails appear about the fifth month of fœtal or embryonic life.

Nails, small pointed pieces of metal, generally with round or flattened heads, used for driving into timber or other material for the purpose of holding separate pieces together. They are of many different lengths and shapes. *Brads* used for nailing floors and ceilings have the head only on one side; the small sharp nails with round flat heads, used by saddlers and upholsterers, are called *tacks;* the small sharp taper nails without heads, used by shoemakers, are called *sprigs;* a variety in which the head is large and the spike small are

called *hob nails;* very large nails are called *spikes.* Until a comparatively recent period almost every kind of nail was produced by hand labor alone, each nail being separately forged from a thin rod of iron. These *wrought* nails are preferable, for many kinds of carpenter work, to those made by machinery. Making of wrought nails retains, in many places, the character of a domestic manufacture, the workman being often assisted by the female members of his family. In 1810 a machine was contrived by which nails could be cut from an iron sheet, and headed at one operation, at the rate of 100 per minute. Since that time great improvements have been made in nail-making machinery, and the method commonly adopted is to cut nails out of sheet iron of the required thickness, an operation which, by the improved processes, is carried on with great rapidity. The quantity produced in this way is astounding, some mills turning out at the rate of 10 miles of nail rods an hour.

Naja, a genus of serpents, including several that are among the most dangerous of all the venomous snakes. The best-known examples of the genus are the cobra de capello of India, and the *N. haje* of Egypt, which is tamed by native jugglers, and is identified by many writers with the asp employed by Cleopatra to bring about her death.

Nama'qualand, GREAT, an extensive region in South Africa, extending along the west coast from the Orange River to Walfish Bay, and inland from the west coast to the Kalahari Desert; est. area 100,000 sq. mi. The greater part of this region is bare and barren, but in part it is favorable for the rearing of cattle. Copper ore appears to be in abundance in several localities. The lion, giraffe, rhinoceros, and hippopotamus, the gemsbok, eland, and other large antelopes are still found here. Germany took possession of Great Namaqualand in 1884. Pop. about 50,000. See *Namaquas.*

Nama'qualand, LITTLE, an electoral division of Cape Colony south of the Orange River. It is a dry and barren region, but derives some importance from its copper mines. The chief mining station is Ookiep, 90 mi. from Port Nolluth, with which it is connected by rail. Pop. over 10,000.

Nama'quas, the name given by Europeans to the Hottentot tribes inhabiting Great Namaqualand. They lead a half pastoral, half predatory life, yielding allegiance to a number of petty chiefs. Polygamy is universal among them. They are gradually disappearing before the Griquas and other mixed races. Missionaries have been laboring among them for some time.

Namay'cush, a fish nearly allied to the salmon, inhabiting the great lakes and rivers of North America. Good sized specimens weigh from 20 to 40 lbs., and it is much esteemed for the table.

Names, PERSONAL.—It is probable that at first all names were significant. Old Testament names are almost all original, that is, given in the first instance to the individual bearing them, and either originated in some circumstance of birth or expressed some religious sentiment, thus—Jacob (supplanter), Isaiah (salvation of Jehovah), Hannah (favor), Deborah (bee), etc. Neither the Hebrews, Egyptians, Assyrians, Babylonians, Persians, nor Greeks had surnames; and in the earliest period of their history the same may be said of the Romans. In course of time, however, every Roman citizen had three, the *prænomen* or personal name, the *nomen* or name of the gens or clan, lastly, the *cognomen* or family name, as Publius Cornelius Scipio. Conquerors were occasionally complimented by the addition of a fourth name or *agnomen,* commemorative of their conquests, as Publius Cornelius Scipio *Africanus.* Greek names refer to the personal appearance or character, and were often supplemented by the occupation, place of birth, or a nickname. Times of great public excitement have had a very considerable influence in modifying the fashion in names. It is impossible to state with any degree of certainty when the modern system of personal nomenclature became general. Surnames were introduced by the Norman adventurers, but were for centuries confined to the upper classes. They became general in Scotland about the twelfth century. In some of the wilder districts of Wales they can hardly be said to have been adopted even yet. The principal sources from which surnames are derived are personal characteristics (Black, Long, Short), rank, profession, or occupation (Bishop, Knight, Miller), localities, or natural objects (Hill, Dale, Stone), and patronymics (Johnson, Wilson, Andrews). The Hebrews had no surnames proper, but to distinguish two men of the same name they used the form Solomon ben David (Solomon son of David). The Welsh use the word *ap* in the same way; Evan ap Richard (John son of Richard=Prichard). In most nations the wife changes her surname on marriage to that of her husband; in Spain, however, she retains it, while the son may adopt either the paternal or maternal name.

Namur (nȧ-mür) (Flemish *Namen*), a town of Belgium, capital of province of same name. The town carries on manufactures of cutlery and hardware, etc. Pop. 28,211. The province, which has an area of 1,413 sq. mi., is finely diversified with well-wooded offsets of the Ardennes. About one half of the whole surface is cultivated. The industry and commerce of the province are largely developed. Its cutlery is particularly famous. Pop. 336,543.

Nanaimo, a port on the east side of Vancouver Island, where there are important coal mines.

Nana Sahib (1825–), the infamous leader of the Sepoys in the Indian mutiny. He was adopted by the ruler of the Mahratta state of Bithoor. On the death of the latter the British government refused to recognize Nana's claim to the succession. In May, 1857, there was a mutiny of the Sepoys in Cawnpore, and Nana placed himself at the head of the mutineers. The Europeans in Cawnpore capitu-

lated on a promise that they should be sent down the Ganges in safety. But the men were all shot down and the women and children massacred. Nana was defeated by Sir H. Havelock, and was driven across the frontier into Nepaul. But there all knowledge of him ceases. The general opinion is that he escaped into Central Asia.

Nan-che, a town in China, province of Chekiang, 40 mi. w. of Yen-chow-foo. It is neat and clean, and about three mi. in circuit. Pop. about 200,000.

Nancy (năn-sē), a town of France, capital of the dep. Meurthe-et-Moselle. The manufactures consist of broadcloth and other woolen stuffs; cotton spinning and weaving; hosiery, lace, all kinds of embroidery, stained paper, etc. The trade is extensive. At Nancy in 1477 was fought the great battle between René, duke of Lorraine, and Charles the Bold of Burgundy, who was defeated and slain. From 1870 to 1873 Nancy was occupied by Germans. Pop. 87,110.

Nankeen' (or Nankin'), a sort of cotton cloth, usually of a yellow color, originally manufactured and imported from Nanking in China. The peculiar color of these cloths is natural to the cotton of which they are made. Nankeen is now imitated in most other countries where cotton goods are woven.

Nanking (that is "Southern Capital," as opposed to Peking, "Northern Capital"), a city of China, capital of the province of Kiangsu, 560 mi. s. by e. of Peking. It is 18 mi. in circumference, and is surrounded by a wall generally above 40 ft. high. It was at one time the capital of the Chinese Empire; but when the seat of government was transferred to Peking, about the end of the fourteenth century, it lost its importance and a great part of its population. The city was held from the spring of 1853 to July, 1864, by the Taipings, who made it their capital. The famous porcelain tower of nine stories and 200 ft. in height, completed in 1432, was destroyed during the Taiping rebellion. It is still one of the chief literary centers of China. Pop. 150,000.

Nanosaurus (Nanosaur), a fossil lizard-like animal belonging to the group Deinosauria, discovered in North America, and about the size of a cat.

Nansen, Fridtjof, b. Oct. 10, 1861, began his career as a "skilober" (snow-shoer) when only four years old, and eventually became known as one of the most accomplished athletes in Norway. Before he was of age he made a notable voyage between Spitzbergen and Greenland to investigate animal life in those regions; and in 1888 he made his memorable expedition across Greenland on the "ice cap," on his return from which he received a grand ovation from his countrymen.

But the achievement on which his fame as an explorer must rest was his expedition, on which he started in June, 1893, from Christiania, the capital of his native land, to the Arctic regions, with twelve companions, in the *Fram*, a vessel constructed after his own plan, especially adapted to resist the pressure of ice floes. In September of the same year, he thrust his vessel into an ice pack, in which the party drifted, thus imprisoned for eighteen months, until they had reached 83° 59′. This was March 14, 1895. Doctor Nansen now with one companion, Johnson, left the ship and made his way by sledges toward the Pole. After the endurance of hardship which, if not related by so truthful a man, would be deemed mythical, he reached an island of the Franz-Joseph Land Archipelago, where he passed the winter of 1895–96 in a stone hut, subsisting on bear meat. At times the clothing of himself and his companion froze to their bodies, and they were so begrimed with grease and soot that they could scarcely be distinguished as human beings. A start for Spitzbergen was made May 19, 1896, and when off Cape Flora they were fortunate enough to encounter Captain Jackson, of the British exploring expedition, who provided them with food and clothing, and after three years of unexampled experience he reached his home, and about simultaneously his vessel, the *Fram*, in command of Captain Sverdrup, reached the Norwegian coast.

Doctor Nansen is a giant in form, and possesses a constitution and muscular system of iron. He was educated at the University of Christiania, and is a thoroughly accomplished scholar. At the same time he is a perfectly modest and unassuming man, and after the recent ovation in England, when princes vied with each other to do him honor, he retired to his log cottage and his family in Norway, happier with them than amid the plaudits of metropolitan throngs. The most important discovery made by Doctor Nansen was the development of the fact that there is no Arctic continent, as has been invariably assumed by previous Arctic explorers, but only an immense ocean of great depth.

Nansen's plans for preserving the health of his crew were admirable and effective. The ship was surrounded, during its stay in the polar regions, with the light from an arc-light plant, and the Doctor painted or photographed in his saloon by the same light, which was generated from the power obtained by a windmill, the sailors manning a capstan when the wind failed. During the long hours of leisure a phonograph cheered the lonely little party with the songs Nansen's wife had sung into it before they started.

During his three years' exile from civilization he passed over hundreds of miles of hitherto unexplored coast, discovered a number of new islands, and traversed 50,000 sq. mi. of unknown waters. The highest point reached by him in the Arctic regions was 195 mi. nearer the North Pole than any man had ever before been, and 261 mi., by his calculation, from the Pole itself. Pl. 28, Vol. III.

Nantes (nănt), a town of France, capital of the department of Loire-Inférieure, 269 mi. w.s.w. of Paris. The situation on an important navigable river, within 40 mi. of the ocean, is highly advantageous for commerce. The chief industries are shipbuilding, and the

manufacture of ships' boilers and machinery, linens, cottons, sailcloth, flannel, chemicals, leather, ropes, soap, etc. Nantes is a flourishing seaport; but part of the foreign trade centers in St. Nazaire, at the mouth of the Loire. Before the conquest of Gaul by the Romans, Nantes was a place of some note. For a long time it formed one of the most valuable possessions of the dukes of Brittany, but in 1499 the heiress of the dukedom, Anne of Brittany, having here married Louis XII, it passed with the rest of her possessions to the crown of France. In 1793 it was the scene of some of the most atrocious massacres of the French Revolution. Men, women, and children were ruthlessly destroyed by shooting and by drowning. As many as 600 persons are known to have perished in one day, and it is estimated that in the town and surrounding country 30,000 people were destroyed. Pop. 110,638.

Nantes, Edict of, a decree issued by Henry IV of France, April 13, 1598, ending the religious wars of the country. It put the Huguenots on an equality with the Catholics in political rights and conceded them greater freedom of worship than they had formerly enjoyed. In 1620 the Huguenots in their political congress confiscated all the property of the Roman Catholic churches and constituted throughout France a military and civil organization for Huguenot ends. In 1685 by a decree of Louis XIV the edict was revoked. As a consequence of this act about 500,000 of the Huguenots emigrated to other countries.

Nanticoke, Luzerne co., Pa., on Susquehanna River, 7 mi. s.w. of Wilkesbarre. Railroads: Pennsylvania; D. L. & W.; and Central R. R. of N. J. Industries: coal works, coal mines, and breakers. Inexhaustible beds of anthracite coal in vicinity. The town was the site of a village of Nanticoke Indians and was first settled in 1793, and became a borough in 1874. Pop. 1900, 12,116.

Nantucket, an island of Massachusetts, 18 mi. s. of Cape Cod, 15 mi. long, and from 3 to 4 mi. wide. The town of Nantucket is situated on the north side of the island, and has a deep and secure harbor. The climate is mild in winter and cool in summer.

Naph'tali (Hebrew, "my wrestling"), the sixth son of Jacob, and the head of one of the twelve tribes. The tribe had its full share in repelling the incursions of the Canaanites during the first centuries of the conquest, but disappears from history when Tiglath-pileser overran the north of Israel and bore away the whole of the population to Assyria. Under the title of Galilee the district occupied by the tribe became in New Testament times more famous than it had ever been before.

Naphtha, a term which includes most of the inflammable liquids produced by the dry distillation of organic substances. *Mineral or native naphtha,* or *petroleum,* is an inflammable liquid which is found in nearly all countries, but especially at Baku, on the Caspian Sea, and in Canada and Pennsylvania. It consists of a mixture of hydrocarbons chiefly belonging to the paraffin series, but it also contains members of the olefine and of the benzene series. *Boghead naphtha,* which is also known as *photogen* and *paraffin oil,* is obtained by distilling certain minerals allied to coal. *Coal naphtha* is obtained by the distillation of coal tar. After the *light oil* has been separated it is shaken with caustic soda and afterward with sulphuric acid. The liquid portion is then run off and rectified. *Shale naphtha* is a mixture of paraffins obtained by distilling bituminous shales. When petroleum is distilled, that portion which distils below 169° F. is sold as *petroleum spirit* or *petroleum ether,* and is used for dissolving india rubber and making varnishes. The next fraction of the distillate is sold under the names benzoline, paraffin oil, or mineral sperm oil. Benzene occurs in petroleum, but is more abundant in the light oil obtained in distillation of coal tar. Nitrobenzene is largely employed in the preparation of aniline.

Naphthalene is a crystalline hydrocarbon with an odor of coal gas, and is occasionally deposited in gas pipes in cold weather. It is a very common product of the action of a high temperature upon substances rich in carbon; coal and wood yield it on distillation; marsh gas, alcohol vapor, and ether vapor deposit crystals of naphthalene when passed through a red-hot tube. When coal tar is distilled and the temperature has risen to about 200° C., the distilled liquid partly solidifies on cooling from the crystallization of naphthalene. This portion is pressed to expel the liquid part and boiled with alcohol, which deposits the naphthalene as it cools. Naphthalene red was discovered in 1867; it comes into commerce under the name of *magdala* red, in the form of a black-brown crystalline powder.

Naphthyl, a hydrocarbon obtained, together with other products, by heating naphthalene with a mixture of manganese dioxide and sulphuric acid diluted with twice its weight of water. *Naphthol,* or *naphthyl alcohol,* is a derivative of naphthyl. Dinitronaphthol is produced from *naphthol,* and is one of the most beautiful and permanent of yellow dyes, coloring silk and wool in all shades from light lemon to deep, gold-yellow.

Napier (nā'pi-ēr), a town of New Zealand, situated on Hawke's Bay, in North Island. The district is principally a grazing one, large quantities of wool being grown. Tinned and frozen meat are also exported. Pop. 7,680.

Napier, John (1550–1617), Laird of Merchiston, near Edinburgh, the inventor of logarithms. He was educated at St. Andrews, traveled on the Continent, and ultimately settled down at the family seats of Merchiston, near Edinburgh, and Gartness, in Stirlingshire, as a recluse student. In 1614 he published his book of logarithms (*Logarithmorum Canonis Descriptio;* Edinburgh, 4to). The invention was very soon known over all Europe, and was everywhere hailed with admiration by men of science. Napier followed it up, in 1617, by publishing a small treatise, giving an account of a method of performing the operations of multiplication and division by means

of a number of small rods. These materials for calculation maintained for many years a place in science, and are known by the appellation of Napier's Bones.

Naples (nā'plz) (Italian, *Nap'oli*), a city in Southern Italy the largest in the kingdom, situated on the northern shore of the beautiful Bay of Naples, about 160 mi. from Rome. Naples has a university, dating from 1224, and attended by over 3,000 students; many other educational institutions, and numerous hospitals and charitable foundations. The manufactures, which are numerous but individually unimportant, include macaroni, woolens and cottons, silks known as *gros de Naples*, glass, china, musical instruments, flowers and ornaments, perfumery, soap, chemicals, machinery, etc. The harbor accommodation has recently been extended, and the trade is important. The exports consist chiefly of bones, cream of tartar, hoops, linseed, hemp, wheat, figs, gloves, licorice, madder, coral, macaroni, oil, wine, wool, tallow, rags, and silk, raw, dyed, and manufactured. Naples is one of the most densely populated cities of Europe, and one of the most peculiar features of the city is its unique population and the universal publicity in which life is passed. In the environs are situated the tomb of Vergil, the ancient ruined cities of Herculaneum and Pompeii, the remains of Roman temples, villas, palaces, and tombs, together with the physical phenomena of Vesuvius. Pop. 530,875.

History.—Naples was founded by a Greek colony from the town of Cumæ many centuries before Christ. It took the name of Neapolis ("New City") to distinguish it from a still older Greek city adjoining called *Parthenŏpē*. It passed to the Romans in 290 B.C. In 536 A.D. it was taken by Belisarius, and was pillaged by Totila in 542. In 1130 the Norman Robert Guiscard united the south of Italy and the adjacent island of Sicily into one political unity, and from that period the history of Naples ceases to be the history of a city, but becomes the history of a kingdom forming part of the kingdom of the Two Sicilies, Naples being recognized as the metropolis. In the year 1189 the kingdom passed from the Norman to the Swabian race. In 1266 Charles of Anjou defeated the Swabians, and was crowned king of the Two Sicilies. The kingdom was ruled by this dynasty until 1441, when it came under the dominion of the princes of Aragon. In the early part of the sixteenth century it came into the possession of Spain, which governed it by viceroys until 1707. Under the rule of the Spanish viceroys broke out the famous insurrection under Masaniello in 1647. It was similarly governed by Austria until 1735, when it was erected into an independent monarchy in favor of Don Carlos, or Charles of Bourbon. On the latter's accession to the throne of Spain in 1759 he was succeeded by his son Ferdinand IV. In 1798 the French republicans entered Naples, which became a republic; but a loyalist rising led to the return of the king. His reign was again interrupted in 1806, when Napoleon succeeded in placing first his brother Joseph, and on Joseph's removal to Spain, his brother-in-law Murat, on the throne of Naples. In 1815 Ferdinand regained his throne, and changed his title to Ferdinand I. Upon his death in 1825 he was succeeded by Francis I, who died in 1830. This prince was followed by his son Ferdinand II, notorious under the nickname of *Bomba*. He died in 1859, and his son Francis II was his successor. The latter continued the abuses of the old régime, and in the revolution that broke out in 1860 under the guidance of Garibaldi he was deposed, and Naples and Sicily were added to the kingdom of Italy.

Naples, Bay of (anciently, *Crater Sinus*), on the west coast of Italy, in the Mediterranean, extending for about 35 mi. from the Capo di Mîseno, its northwest boundary, to the Punta della Campanella, its southeast limit. It is separated from the open sea by the islands of Procida, Ischia, and Capri. Its shores have for ages been the scene of powerful volcanic agency, and the scenery has long been celebrated for its beauty and grandeur. Mount Vesuvius is the most striking and distinctive feature.

Naples Yellow, a pale golden-yellow pigment composed of the oxides of lead and antimony. It is employed not only in oil painting, but also for porcelain and enamel. Chromate of lead is sometimes used as a substitute for this color.

Napoleon I (1769–1821), Emperor of the French, was b. at Ajaccio, Corsica, and was the son of Charles Bonaparte, an advocate, and of Letizia Ramolino. In his tenth year he was sent to the military school of Brienne, and after a short time spent at that of Paris he received, in 1785, his commission as lieutenant of artillery. In 1792 he became captain of artillery, and in 1793 he was sent, with the commission of lieutenant colonel of artillery, to assist in the reduction of Toulon, then in the hands of the British. The place was captured (December 19) entirely through his strategic genius; and in the following February he was made a brigadier general of artillery. In 1795, when the mob of Paris rose against the Convention, Napoleon was made commander of the 5,000 troops provided for its defense. He had only a night to make arrangements, and next morning he cleared the streets with grape, disbanded the national guard, disarmed the populace, and ended the outbreak. On March 9, 1796, he married Joséphine Beauharnais, and soon after he had to depart to assume the command of the army of Italy against the forces of Austria and Sardinia. After a series of victories, culminating in that of Lodi (May 10), Naples, Modena, and Parma hastened to conclude a peace; the pope was compelled to sign an armistice; and the whole of Northern Italy was in the hands of the French. Army after army sent by Austria was defeated (at Roveredo, Bassano, Arcole, Rivoli, etc.); Napoleon carried the war into the enemy's country; and by the Peace of Campo Formio, which followed (Oct. 17, 1797), Austria ceded the Netherlands and Lombardy, and received the

province of Venetia. The pope had previously been forced to cede part of his dominions.

In December, 1797, Napoleon returned to Paris. About this time the Directory determined to invade Egypt, as a preliminary step to the conquest of British India. Napoleon was put in command of the expedition, and on July 1, 1798, he landed at Alexandria. This city fell on July 4, and Cairo was taken on the 24th, after the sanguinary battle of the Pyramids. On August 4, Nelson annihilated the French fleet in the Bay of Aboukir. All means of return to Europe for the French were thus cut off; but Napoleon having suppressed with rigor a riot in Cairo, advanced to attack the Turkish forces assembling in Syria. He took El Arish and Gaza, and stormed Jaffa. But after sixty days' siege he was compelled to abandon the attempt to capture Acre, which was defended by a Turkish garrison under Djezzar Pasha, assisted by Sir Sidney Smith and a small body of English sailors and marines. He re-entered Cairo on June 14, 1799, and on July 25 attacked and almost annihilated a Turkish force which had landed at Aboukir. On August 22 he abandoned the command of the army to Kléber, and embarking in a frigate landed at Fréjus, October 9, having eluded the English cruisers. He hastened to Paris, secured the co-operation of Moreau and the other generals then in the capital, and abolished the Directory on the 18th and 19th Brumaire (November 9 and 10). A new constitution was then drawn up chiefly by the Abbé Siéyès, under which Napoleon was made first consul, with Cambacérès and Lebrun as second and third consuls. From this time he was virtually ruler of France.

Napoleon's government was marked by sagacity, activity, and vigor in the administration of civil affairs, and so far was highly beneficial to France. But war was his element, and in 1800 he resolved to strike a blow at Austria. Having executed a daring march into Italy across the Great St. Bernard, he defeated the Austrians at Marengo, and after the decisive battle of Hohenlinden Austria obtained peace by the treaty of Lunéville, 1801. Treaties were subsequently concluded with Spain, Naples, the pope, Bavaria, Portugal, Russia, Turkey, and finally, March 27, 1802, the treaty known as that of Amiens was signed by Britain. In 1802 Napoleon was proclaimed by a decree of the senate consul for life, and in 1804 he had himself crowned as emperor, upward of 3,000,000 votes of the people being given in favor of this measure. To this period belongs the famous body of laws known as the *Code Napoléon*.

In 1803 war had again broken out with Britain, and Napoleon collected an army and flotilla which were to invade England. In 1805 Britain, Russia, Austria, and Sweden united against Napoleon, who marched at once across Bavaria at the head of 180,000 men, and compelled the Austrian General Mack to capitulate at Ulm with 23,000 men (October 20) the day before Nelson's great victory at Trafalgar. On November 13 he entered Vienna, and on December 2, having crossed the Danube, he completely routed the allied Russian and Austrian armies at Austerlitz. The Austrian emperor instantly sued for peace, giving up to France all his Italian and Adriatic territories. In February, 1806, a French army occupied the continental part of the Neapolitan states, of which Joseph Bonaparte was declared king on the deposition of their former sovereign. Another brother of the emperor, Louis, became king of Holland. Various districts in Germany and Italy were erected by the conqueror into dukedoms and bestowed upon his most successful generals. This brought him into collision with Prussia, and war was declared October 8. On the 14th Napoleon defeated the enemy at Jena, while his general, Davoust, on the same day gained the victory of Auerstädt. On the 25th Napoleon entered Berlin and issued the celebrated Berlin decrees. He then marched northward against the Russians, who were advancing to assist the Prussians. At Pultusk (December 28) and at Eylau (Feb. 8, 1807) he met with severe checks; but on June 14 was fought the battle of Friedland, which was so disastrous to the Russians that Alexander was compelled to sue for an armistice. On July 7 the Peace of Tilsit was concluded, by which the king of Prussia received back half of his dominions, and Russia undertook to close her ports against British vessels. The duchy of Warsaw was erected into a kingdom and given to the king of Saxony; the kingdom of Westphalia was formed and bestowed upon Jérôme, Napoleon's youngest brother; and Russia obtained a part of Prussian Poland, and by secret articles was allowed to take Finland from Sweden. As Portugal had refused to respect the Berlin decrees, Napoleon sent Junot to occupy Lisbon (Nov. 30, 1807). The administrative affairs of Spain having fallen into confusion, Napoleon sent an army under Murat into that kingdom, which took possession of the capital, and by the Treaty of Bayonne Charles IV resigned the Spanish crown, which was given to Joseph Bonaparte, Murat receiving the vacant sovereignty of Naples. The great body of the Spanish people rose against this summary disposal of the national crown, and Britain aided them in their resistance. Thus was commenced the Peninsular War, which lasted seven years. A French squadron was captured by the British at Cadiz (June 14, 1808); General Dupont surrendered at Baylen with 18,000 men (July 22); Junot was defeated by Sir Arthur Wellesley (Wellington) at Vimeira (August 21). Napoleon rushed to the scene of action in October at the head of 180,000 men, and entered Madrid in spite of all resistance by the Spaniards on December 4. The British troops, now under Sir John Moore, were driven back upon Corunna, where they made a successful stand, but lost their general (Jan. 16, 1809). In the meantime Austria again declared war and got together an army in splendid condition under the Archduke Charles. Napoleon hurried into Bavaria, encountered the archduke at Eckmühl (April 22), and completely defeated him; on May 13 he again entered Vienna.

On May 21 and 22 he was himself defeated at Aspern and Esslingen; but on July 6 the Austrians were crushed at Wagram, which enabled Napoleon to dictate his own terms of peace; these were agreed to October 14 at Schönbrunn. On his return to Paris Napoleon was divorced from Joséphine, who had borne him no children, and on April 2, 1810, he was married to the Archduchess Maria Louisa of Austria.

The years, 1810 and 1811 were the period of Napoleon's greatest power. On the north he had annexed all the coast line as far as Hamburg, and on the south Rome and the southern Papal provinces. But now the tide began to turn. Russia found it impossible to carry out the continental blockade and give due effect to the Berlin decrees; so in May, 1812, Napoleon declared war against that country, and soon invaded it with an army of about 500,000 men. The Russians retired step by step, wasting the country, carrying off all supplies, and avoiding as far as possible general engagements. The French pushed rapidly forward, defeated the Russians at Borodino and elsewhere, and entered Moscow only to find the city on fire. It was impossible to pursue the Russians farther, and nothing remained but retreat. The winter was uncommonly severe, and swarms of mounted Cossacks incessantly harassed the French, now sadly demoralized by cold, famine, disease, and fatigue. Of the invaders only about 25,000 left Russia. Napoleon immediately ordered a fresh conscription, but the spirit of Europe was now fairly roused. Another coalition, consisting of Prussia, Russia, Great Britain, Sweden, and Spain, was formed, which early in 1813 sent its forces toward the Elbe. Napoleon had still an army of 350,000 in Germany. He defeated the allies at Lützen, at Bautzen, and at Dresden; but the last was a dearly-bought victory for the French, who were now so outnumbered that their chief was compelled to fall back on Leipsic. There he was completely hemmed in, and in the great "Battle of Nations," which was fought October 16, 18, and 19, he was completely defeated. He succeeded in raising a new army, and from January to March, 1814, he confronted the combined hosts of the allies. But numbers were against him; and Wellington rapidly advanced upon Paris from the south. March 30 the allies captured the fortifications of Paris, and on the 31st the Emperor Alexander and Wellington entered the city. April 4 Napoleon abdicated at Fontainebleau. He was allowed the sovereignty of the Island of Elba, with the title of emperor and a revenue of 6,000,000 francs, and Louis XVIII was restored. After a residence of ten months he made his escape from the island, and landed at Fréjus March 1, 1815. Ney and a large part of the army joined him, and he made a triumphal march upon Paris; but it was mainly the army and the rabble that he now had on his side. The allied armies once more marched toward the French frontier, and Napoleon advanced into Belgium to meet them. June 16 he defeated Blücher at Ligney, while Ney held the British in check at Quatre-Bras. Wellington fell back upon Waterloo, where he was attacked by Napoleon on the 18th, the result being the total defeat of the French. The allies marched without opposition upon Paris. Napoleon abdicated in favor of his son, and tried to escape from France, but failing he surrendered to the captain of a British man-of-war. With the approval of the allies he was conveyed to the island of St. Helena, where he was confined for the rest of his life. He was buried in the island, but in 1840 his remains were transferred to the Hôtel des Invalides at Paris. Pl. 18, Vol. II.

Napoleon II, Napoleon François Joseph Charles Bonaparte (1811–1832), only son of the preceding. In his cradle he was proclaimed King of Rome. On the first abdication of the emperor he accompanied his mother, Maria Louisa of Austria, to Vienna. His title there was Duke of Reichstadt. He never assumed the title of Napoleon II; but on the accession of his cousin Louis Napoleon in 1852, some title being necessary, the late emperor took that of Napoleon III, which being recognized by the governments of Europe, implied the recognition of the former title.

Napoleon III, Charles Louis Napoleon Bonaparte (1808–1873), emperor of the French. He was the youngest son of Louis Bonaparte, brother of Napoleon I and king of Holland, and of Hortense de Beauharnais. His early life was spent chiefly in Switzerland and Germany. By the death of his cousin the Duke of Reichstadt (Napoleon II, see above) he became the recognized head of the Bonaparte family, and from this time forward his whole life was devoted to the realization of a fixed idea that he was destined to occupy his uncle's imperial throne. In 1836 an attempt was made to secure the garrison of Strasburg, but the affair turned out a ludicrous failure. In 1840 he made a foolish and theatrical descent on Boulogne, was captured, tried, and sentenced to perpetual confinement in the fortress of Ham. After remaining six years in prison he escaped and returned to England. On the outbreak of the revolution of 1848 he hastened to Paris, and securing a seat in the National Assembly, he at once commenced his candidature for the presidency. On the day of the election, December 10, it was found that out of 7,500,000 votes Louis Napoleon had obtained 5,434,226; Cavaignac, who followed second, had but 1,448,107. On the 20th, the prince-president, as he was now called, took the oath of allegiance to the republic. He looked forward to a higher position still, however, and pressed for an increase of the civil list from 600,000 francs first to 3,000,000, then to 6,000,000, with his term of office extended to ten years, and a residence in the Tuileries. At last, on the evening of Dec. 2, 1851, the president declared Paris in a state of siege, a decree was issued dissolving the assembly, 180 of the members were placed under arrest, and the people who exhibited any disposition to take their part were shot down in the streets by the soldiers. Another decree was published at the same time ordering the re-establishment

of universal suffrage, and the election of a president for ten years. When the vote came to be taken, on the 20th and 21st of the same month, it was discovered that 7,439,216 suffrages were in favor of his retaining office for ten years, with all the powers he demanded, while only 640,737 were against it.

As soon as Louis Napoleon found himself firmly seated he began to prepare for the restoration of the empire. In January, 1852, the National Guard was revived, a new constitution adopted, and new orders of nobility issued; and at last, on December 1, Louis Napoleon Bonaparte was proclained emperor under the title of Napoleon III. On Jan. 29, 1853, the new sovereign married Eugénie Marie de Montijo, countess de Teba. In March, 1854, Napoleon III, in conjunction with England, declared war in the interest of Turkey against Russia. In April, 1859, war was declared between Austria and Sardinia, and Napoleon took up arms in favor of his Italian ally, Victor Emmanuel. The allies defeated the Austrians at Montebello, Magenta, Marignano, and Solferino. By the terms of the Peace of Villafranca Austria ceded Lombardy to Italy, and the provinces of Savoy and Nice were given to France in recognition of her powerful assistance. In 1860 the emperor sent out an expedition to China to act in concert with the British; and in 1861 France, England, and Spain agreed to dispatch a joint expedition to Mexico for the purpose of exacting redress of injuries, but the English and Spaniards soon withdrew. The French continued the quarrel, and an imperial form of government was initiated, Maximilian, archduke of Austria, being placed at its head with the title of emperor. Napoleon, however, withdrew his army in 1867, and the unfortunate Maximilian, left to himself, was captured and shot. On the conclusion of the Austro-Prussian War of 1866 Napoleon, jealous of the growing power of Prussia, demanded a reconstruction of frontier, which was peremptorily refused. The ill-feeling between the two nations was increased by various causes, and in 1870, on the Spanish crown being offered to Leopold of Hohenzollern, Napoleon demanded that the King of Prussia should compel that prince to refuse it. Notwithstanding the subsequent renunciation of the crown by Leopold, war was declared by France (July 19). On July 28 Napoleon set out to take the chief command, and September 2 the army with which he was present was compelled to surrender at Sedan. One of the immediate causes of this disaster was a revolution in Paris. The empress and her son secretly quitted the French capital and repaired to England, where they took up their residence at Camden House, Chiselhurst. Here they were rejoined by the emperor (who had been kept a prisoner of war for a short time) in March, 1871, and here he remained till his death. His only child, the prince imperial, who had joined the British army in South Africa as a volunteer, was killed by the Zulus June 2, 1879.

Narbonne (Latin, *Narbo Martius*), a town of Southern France, department of Aude. The manufactures are not important. The honey of Narbonne is celebrated. Narbonne was the first colony which the Romans founded beyond the Alps. It became the capital of Gallia Narbonensis, but is very poor in Roman remains. Pop. 25,067.

Narcis'sus, according to Greek mythology the son of the river god Cephissus. The young Narcissus was of surpassing beauty, but excessively vain and inaccessible to the feeling of love. Echo pined away to a mere voice because her love for him found no return. Nemesis determined to punish him for his coldness of heart, and caused him to drink at a certain fountain, wherein he saw his own image, and was seized with a passion for himself of which he pined away. The gods transformed him into the flower which still bears his name.

Narcissus.

Narcis'sus, an extensive genus of bulbous plants, mostly natives of Europe, nat. order Amaryllidaceæ. The species are numerous, and from their hardiness, delicate shape, gay yellow or white flowers, and smell, have long been favorite objects of cultivation, especially the daffodil, the jonquil, polyanthus narcissus, and white narcissus. Some of the more hardy species grow wild in English woods and under English hedges.

Narcot'ic, derived from a Greek term signifying numbness or torpor, is the name given to a large class of substances which, in small doses, diminish the action of the nerves. Most narcotics are stimulating when given in moderate doses; in larger doses they produce sleep; and in poisonous doses they bring on stupor, coma, convulsions, and even death. Opium, hemlock, henbane, belladonna, aconite, camphor, digitalis, tobacco, alcohol, leopard's bane, and a variety of other substances are narcotics.

Narcotine, an alkaloid contained in opium to the amount of 6 or 8 per cent. It is poisonous in large doses, about 45 gr. being sufficient to kill a cat.

Narragansett Bay, a bay of the U. S., running into Rhode Island for 28 mi.

Narses, the companion-in-arms of Belisarius, and one of the most successful generals of the Emperor Justinian, was an Asiatic slave and eunuch whom the latter had taken into favor and appointed to a command in 538 A. D. Between that period and 552 he put an end to the dominion of the Goths in Italy, and in 553 was himself appointed exarch, and fixed his

court at Ravenna. He was deposed under the Emperor Justinus II 565, and d. at Rome 568.

Narvaez (når-vä'eth), Ramon Maria (1800–1868), duke of Valencia, Spanish statesman and general. Early in life he entered the Spanish army, and rapidly acquired distinction. When Gomez, the Carlist general, was engaged in his adventurous march through Spain in 1836, Narvaez, who then commanded a division under Espartero, was directed to pursue him, and totally routed him near Arcos. He then devoted himself to politics, and became the rival of Espartero himself. Having taken part in an unsuccessful rising of the progressista party in 1838, he fled to France and remained there five years. In 1843 he hastened to Spain, put himself at the head of an insurrection, and entered Madrid victorious (July, 1843). In the following year he formed his first ministry, and received from Queen Isabella the rank of marshal and the title of Duke of Valencia. His government was overthrown in 1846, but he was soon recalled, and during the remainder of his life was several times entrusted with the formation of a cabinet.

Narwhal, a cetaceous mammal found in the northern seas, averaging from 12 to 20 ft. in length. The body color is whitish or gray

Narwhal.

spotted with darker patches. There is no dorsal fin. The dentition of the narwhals differs from that of all other members of the dolphin family. In the female both jaws are toothless, but the male narwhal has two canines in the upper jaw, which are sometimes developed into enormous projecting tusks, though commonly only the one on the left side is so developed, being straight, spiral, tapering to a point, and in length from 6 to 10 ft. It makes excellent ivory. From the frequency with which the narwhal appears as having a single horn it has obtained the name of the *Sea Unicorn, Unicorn Fish,* or *Unicorn Whale.* The food of the narwhal appears to consist chiefly of mollusca, and notwithstanding its formidable armature it is said to be inoffensive and peaceable. The Greenlanders obtain oil from its blubber, and manufacture its skins into useful articles.

Nasby, Petroleum V. See *Locke, David R.*

Naseby, a village in Northamptonshire, England, 12 mi. from Northampton. In 1645 Fairfax and Cromwell entirely defeated Charles I in the vicinity.

Nash, Thomas (1558–1600), an English satirist and dramatist, b. at Lowestoft Suffolk. He graduated at Cambridge in 1584, but was afterward expelled for satirizing the authorities. After spending several years on the continent he returned to London in 1589, and took an active part in the Martin Marprelate controversy, writing several pamphlets on the prelatical side. In conjunction with Marlowe he wrote a drama, *Dido, Queen of Carthage,* and in 1592 produced a comedy of his own, *Summer's Last Will and Testament,* which was acted before Queen Elizabeth.

Nashua, Hillsborough co., N. H. on Merrimac and Nashua rivers. Railroads: B. & M.; W. C. W. & N.; N. B. & A.; W. N. & R.; and B. N. & K. Industries: large cotton mills, iron, steel, and brass works, woolen mills, card and glazed paper mill, and engine works. The town was first settled about 1675 and became a city in 1853. Pop. 1900, 23,898.

Nashville, county seat of Davidson co., Tenn., and capital of the state; on both banks of the Cumberland river; 233 m. e. n. e. of Memphis; on the L. & N. and the N. C. & St. L. railroads. The Cumberland river gives it steamboat communication with the Mississippi system. The city is noted for its commerce, manufactures and educational institutions. It is the leading manufacturing city of Tennessee, having products in 1900 valued at $18.-469,823. It is the chief center of flour and grist-milling; other important manufactures are lumber and timber products and fertilizers. From its unusual educational advantages, it is called "The Athens of the South." It is the seat of Vanderbilt University, the University of Nashville and Fisk University. Pop. 1900, 80,865.

Nasirabad', an Indian cantonment in Rajputana, 15 mi. s.e. from Ajmere. It is garrisoned by troops of the Bombay army. Pop. 21,320 men. Pop. 10,243.

Nasmyth (nā'smith) James (1808–1890), was educated at the School of Arts, Edinburgh, and in engineering under Maudsley in London. He removed in 1834 to Manchester, where he became a successful machine constructor and inventor. The steam hammer, which has rendered possible the immense forgings now employed, was invented by him in 1839. The steam pile driver, and the safety foundry ladle, are among his other inventions. He has also acquired fame as an astronomer.

Nast, Thomas, caricaturist, was b. in Bavaria in 1840; was brought to the U. S. in 1846. After service in England and Italy he began drawing war sketches for *Harper's Weekly* in 1862. In his particular line, pictorial satire, Nast stands in the foremost rank. He died Dec. 7, 1902.

Nastur'tium, or Indian cress, an American climbing annual with pungent fruits and showy orange flowers.

Natal', a British colony on the southeast coast of Africa, area 21,150 sq. mi. The only spot where sheltered anchorage can be obtained is at Port Natal, a fine circular bay near the center of the coast. The mineral productions are principally coal, ironstone, limestone, and marble. Gold has also been found in various localities. The soil is generally rich and strong. On the higher forest and table-land cattle thrive well; and in the interior wheat, barley, oats, maize, beans, and vegetables of almost every description have been largely and successfully grown. In many parts the vine and fruit trees thrive well, and in the coast region generally cotton, tobacco, indigo, sugar-cane, and coffee grow well. In the less-frequented parts of the interior elephants and lions are still occasionally seen; the leopard is not uncommon, and hyenas, tiger cats, antelopes, jackals, ant-bears, and porcupines are numerous. The hippopotamus has still his haunts in several of the rivers, and there are numbers of small crocodiles. The birds comprise the vulture, several varieties of eagle, the secretary bird, wild turkey, etc. Natal was discovered on Christmas day, 1497, by Vasco da Gama, a Portuguese, and named by him "Terra Natalis." The first settlers were the Dutch Boers, who left Cape Colony in 1836, and in 1839 removed to Port Natal and proclaimed themselves an independent republic. The establishment of a hostile settlement at the only port between Algoa and Delagoa bays was incompatible with British interests, and in 1845 Natal, after a formidable resistance by the Boers, was proclaimed a British possession In 1856 it was separated from Cape Colony and made a separate colony. The capital is Pietermaritzburg or Maritzburg. The governor is appointed by the crown, and is assisted in the administration of the colony by an executive and a legislative council. Twenty-three members of the latter are elected by counties and burghs. The trade, especially with the interior, has been greatly facilitated by the railways, of which the colony has some 250 mi. Wool and gold are the chief exports. Pop. 543,913 comprised of 46,788 whites, 41,142 Indians, and 455,983 natives (chiefly Kaffirs).

Natato'res, the order of swimming birds characterized by a boat-shaped body; usually by a long neck, short legs placed behind the center of gravity so as to act as paddles, toes webbed or united by a membrane to a greater or less extent, close oily plumage to protect them from sudden reductions of temperature from the water, in which they mostly live and obtain their food. The young are able to swim and procure food for themselves the moment they are liberated from the shell. The Natatores include the ducks, geese, swans, flamingoes, the penguins, auks, divers, grebes, gulls, pelicans, cormorants, gannets, frigate birds, darters, and others.

Natchez, Adams co., Miss., on the Mississippi River, 279 mi. above New Orleans, and 100 mi. s.w. of Jackson. Railroads: N. O. & N. W. Louisville; N. O. & T. Industries include cotton mills, ice factories, foundries, etc. It is the center of a rich cotton-raising district and has steamboat connection with the Mississippi Valley. The French first settled Natchez in 1716 and later it was the residence city of many wealthy planters. The Natchez Indians massacred many people here in 1849 and in 1862 the town was captured by Farragut's fleet. Pop. 1900, 12,210.

Natick, Middlesex co., Mass., 18 mi. s.w. of Boston. Railroad, Boston & Albany. Manufactured articles include clothing, boots and shoes, base balls, baby carriages, woodenware, etc. Pop. 1900, 9,488.

Nation (Latin, *nātio*, from *natus*, born), either a people inhabiting a certain extent of territory and united by common political institutions, such as the English nation; or an aggregation of persons of the same ethnological family and speaking the same or a cognate language. In some universities, as in those of Glasgow and Aberdeen, for instance, the students are divided into "nations" to distinguish those from different districts or countries. This custom originated in the University of Paris antecedent to the institution of faculties.

National Debt, an aggregate of money contracted to be paid by a government to individuals, corporations, or other governments, for amounts advanced or assessed for war or commercial purposes. The basis on which a nation can borrow money is its power to appropriate the revenue in payment of the principal, or to make special levies for the payment of the interest. Prior to the prevalent system of banking and financial and commercial credit, national debts were contracted on a comparatively small scale, and were mainly effected by pledging the crown jewels or the inherited lands of the reigning dynasties. After the system of national credits became established, governments began to borrow money freely, and their evidences of indebtedness competed in the markets of the world with those of individuals and corporations.

At various periods statesmen have become alarmed over the great increase in the public debts of given nations, but experience has proved their fears to be in the main groundless. When Adam Smith, the noted writer on political economy, entered his protest against "the progress of the enormous debts which at present (in 1776) oppress, and will in the long run probably ruin, all the great nations of Europe," the public debts of the entire civilized world were less than one tenth of their present aggregate, which is estimated in round numbers to be in the neighborhood of twenty-nine billion dollars.

The English national debt was mainly acquired during the wars with Napoleon, but it is since the middle of the present century that the other European nations have rapidly enhanced their public indebtedness. In 1862 foreign public stocks to the amount of nearly $3,500,000,000 were quoted on the London Stock Exchange, and within a decade this amount had increased to about $12,500,000,000. The growth of national debts during the past thirty years is shown by the following table:—

	1870.	*1900.*
France	$4,500,000,000	$5,850,000,000
United Kingdom.	3,900,000,000	3,100,780,000
Austria-Hungary	1,750,000,000	1,168,035,000
Russia (European)	1,700,000,000	3,029,235,000
Italy	1,950,000,000	2,385,944,000
United States	2,220,000,000	1,107,711,000
Spain	1,375,000,000	1,788,514,000
Germany	1,000,000,000	570,040,000
Australasia	230,000,000	305 911,000
Turkey	675,000,000	784,469,000
Portugal	345,000,000	778,630,000
Brazil	475,000,000	577,139,000
Egypt	375,000,000	519,160,000
Canada	62,500,000	345,161,000

Spain owes comparatively the largest sum to foreign lenders, while in France the great bulk of its indebtedness is in possession of the Frenchmen themselves. But nearly every other nation is likewise indebted for enormous amounts to its own subjects. France takes the lead as a lending people on account of the good financial standing and the saving propensities of its people. The example of France would seem to confirm the proposition that a national debt is a good thing, for in that country the national debt and the general prosperity have steadily advanced in equal proportions.

The instances most especially notable of sudden increase in national debts are Japan and the Argentine Republic, the debt of the former being now $500,000,000, and that of the latter $426,143,000. The enormous cattle product of the Argentine pampas is relied upon to keep that nation from predicted bankruptcy, and the recently upspringing industries throughout the entire empire of Japan cannot fail to sustain her credit in the markets of the world. A well-informed writer gives as one reason for the enormous increase of national debts within the past twenty years the fact that money is now much cheaper than it was then. At present the total aggregate of interest paid annually on public debts in the world is $1,115,000,000, while twenty years ago it was $1,000,000,000, although the total debt at that time was $5,000,000,000 less than it is at present. France pays the smallest amount of interest money, namely, $185,000,000 notwithstanding the fact that her national debt is the largest. Great Britain's annual interest is $125,000,000; Russia's $120,000,000; Italy's, $117,000,000; Spain's, $56,000,000 and Austro-Hungary's $186,000,000.

The national debt of the U. S. at the close of the War of 1812 was $45,209,737. In 1832 it had been diminished to $24,322,235, and in 1835 to the minimum of $37,513. By 1850 it had risen again to $63,452,773, and at the breaking out of the Rebellion it was $90,580,873. The following figures show the increase caused by the war and the progress of diminishing the aggregate since its close:—

1862	$ 524,176,412	1876	$2,180,395,067
1863	1,119,772,138	1880	2,128,791,054
1864	1,815,784,370	1890	1,585,821,048
1865	2,680,647,869	1895	1.701,033,661
1866	2,773,236,173	1900	1,107,711,000

Nationalist, a term applied to the Irish political party whose program includes the more or less complete separation of Ireland from Great Britain.

Nations, Law of. See *International Law.*

Natron, native carbonate of soda or mineral alkali, found in the ashes of several marine plants, in lakes in Egypt, and in some mineral springs.

Natterjack (Natterjack Toad), the *Bufo calamīta,* a species of toad found in various parts of Western Europe, in certain parts of Asia (including Thibet), and not uncommon in England. The general color is lightish-brown, spotted with patches of a darker hue. A line or streak of yellowish tint passes down the middle line of the back. It does not leap or crawl like the common toad, but rather runs, whence it has the name of walking or running toad. It has a deep and hollow voice, audible at a great distance. It is often found in dry situations.

Natural Gas, a gas found issuing naturally from crevices in the earth's surface in various localities. It burns like ordinary coal gas, and consists of a mixture of various hydrocarbons, the chief ingredient being marsh gas (firedamp). It has long been known and utilized to some extent as an illuminant, but only in recent years has it attained much importance, being now largely employed in the U. S. both for lighting purposes and as a fuel. It is most abundant in the petroleum regions.

Natural History, in its widest sense, that department of knowledge which comprehends the sciences of zoology and botany, chemistry, natural philosophy or physics, geology, palæontology, and mineralogy. It is now, however, commonly used to denote collectively the sciences of botany and zoology, and it is sometimes restricted to denote the science of zoology alone.

Naturalism, the doctrine that all the operations in the universe, moral as well as physical, are carried on in accordance with fixed laws, and without the interference of any supernatural power.

Naturalization is the process whereby an alien is invested with the privileges and made liable to the obligations of a natural born citizen. It implies the renunciation of one political status and the adoption of another. Formerly many states absolutely refused to recognize any act of naturalization as exempting the party naturalized from the consequences of his allegiance. Thus, the maxim of English common law, *Nemo potest exuere patriam,* precluded a natural born subject from adopting a new political status, and rendered him liable to the penalties of treason if found in arms against his native country. The existence of this principle gave rise to many disputes, more particularly between Great Britain and the U. S. It was not, however, till the Naturalization act of 1870 that the doctrine of the indelibility of natural allegiance was formally abandoned by Britain. In the same year a treaty was entered into between Great Britain and the U. S., which provided that British

subjects becoming naturalized in the U. S. should be treated in all respects as U. S. citizens; and a corresponding provision was made with respect to U. S. citizens becoming naturalized in British dominions.

The conditions on which naturalization will be allowed by the state to which the applicant seeks to affiliate himself vary in different countries. In the U. S. a foreigner must make a declaration on oath of his intention to become naturalized. This oath may be taken before any superior, district, or circuit court, and the applicant must renounce any title of nobility. After the lapse of two years from the date of this declaration, and after five years' residence in the U. S., he becomes an American citizen, and a certificate of naturalization is issued to him. There is, however, no uniform system of registration of such certificates, and, as there are about 3,000 federal and state courts having power to grant them, great difficulties sometimes arise in proving naturalization.

In Great Britain naturalization is effected either through a special act of Parliament or under the Naturalization act, 1870, which provides that any foreigner who has resided in the United Kingdom for five years, or has for that period held service under the crown, can obtain a certificate of naturalization from one of the principal secretaries of state. On the granting of this certificate he is entitled to all political and other rights, powers, and privileges, and is subject to all the obligations to which a natural-born British subject is entitled or subject. The only qualification is that he shall not, when within the limits of the foreign state of which he was previously a subject, be deemed to be a British citizen unless he has ceased to be a subject of that state. In France a foreigner who has obtained permission to become domiciled in France is entitled to letters of declaration of naturalization after three years' residence. Also, by the French Naturalization act, 1889, a foreigner who has resided in France for ten years may at once be naturalized without preliminary ceremony. In Germany naturalization can be conferred only by the higher administrative authorities; the applicant must show that he is at liberty, under the laws of his native country, to change his nationality, or, if he is a minor, that his father or guardian has given him the requisite permission, that he is leading a respectable life, that he is domiciled in Germany, and that he has the means of livelihood. In all countries a married woman is held to be a citizen of the state of which her husband is for the time being a subject, and the naturalization of a father carries with it that of his children in minority. In countries where military service is compulsory naturalization in fraud of this either is prohibited or renders the offender liable to imprisonment, if he returns, and forfeiture of all property subsequently acquired in his native country.

Natural Philosophy, originally the study of nature in general; but now restricted to the various sciences classed under *Physics*,

Natural Selection, a phrase frequently employed in connection with Darwin's theory of the origin of species, to indicate the process in nature by which plants and animals best fitted for the conditions in which they are placed, survive, propagate, and spread, while the less fitted die out and disappear, this process being combined with the preservation by their descendants of useful variations arising in animals or plants. Mr. Darwin's theory takes origin from the fact that all species *vary* to a greater or less extent. These variations, through particular or "selected" members of the species, become perpetuated. What was at first a mere individual variation becomes in this way and through transmission a perpetuated "variety" or a "race." These "races" are subject to a similar process of variation, and varieties of the race may in turn appear; and thus through the variety we in time arrive at forms which present characters so widely different from those of the original species that they may be regarded structurally and functionally as new species. In the domestication and breeding of cattle and sheep, in the numerous varieties of dogs, pigeons, and other animals, man, it is believed, through artificial selection, has imitated nature in her process, and has produced varieties or breeds which differ widely from the original stock or specific type.

Natural Theology is that department of ethics which deals with those propositions relating to the existence and attributes of God and the duty of man which can be demonstrated by human reason, independent of written revelation.

Nature Printing is the art of giving an exact reproduction of natural objects by printing from impressions of the objects themselves formed by pressure on metallic plates. The only subjects to which the art can be applied with success are those with tolerably flat surfaces, such as dried and pressed plants, especially ferns and seaweeds, embroidery and lace, the grain of wood, etc.

Naugatuck, New Haven co., Conn., on Naugatuck River. Railroad, N. Y. N. H. & H. Manufactures include knit underwear, india rubber goods, buttons, cutlery, etc. Pop. 1900, 10,541.

Nau'plius, a term applied to the earliest stage in the development of the lower Crustacea. The naupliiform larva has an ovate unsegmented body, a median eye, and three pairs of limbs. This form is regarded as the primitive form of all crustaceans.

Nau'sea, the sensation of sickness, or inclination to vomit, similar to that produced by the motion of a ship at sea. Though the feeling is referred to the stomach, it frequently originates in disorder of other and remote parts of the body, such as the brain, kidneys, womb, etc.

Nautical Almanac. See *Almanac, Nautical.*

Nau'tilus, a genus of cephalopods with polythalamous or many chambered shells. The shell of the pearly nautilus is a spiral with smooth sides. The turns or whorls are con-

tiguous, the outer whorl covering the inner. The chambers of the shell are separated by transverse septa, and one after the other have been the residence of the animal, being successively abandoned as it has grown. The animal thus always resides in the cavity of its outermost or external chamber. A siphuncle connects the body with the air chambers, passing through each transverse septum till it terminates in the smallest chamber at the inner extremity of the shell. These internal chambers contain only air. By means of the siphuncle the animal is enabled to sink itself or to swim. The nautilus is an inhabitant of the tropical seas. Only three or four existing species are known, though the fossil species exceed a hundred. The name is often loosely applied to the shells of different genera of

Female Paper Nautilus, showing the two modified arms which make and embrace the shell.

mollusca. The animal which has been said to sail in its shell upon the surface of the water is the paper nautilus or argonaut.

Nautilus Propeller, a hydraulic device for propelling ships. Water is admitted into a water-tight compartment in the bottom of the vessel, in which is a horizontal turbine wheel rotated by a vertical shaft from the engine. The rotation of the wheel impels the water through two pipes outwardly to each side of the ship, where it escapes through two nozzles that may be directed either toward the bow or stern of the vessel, causing her either to go ahead or back, as the case may be.

Nauvoo, Hancock co., Ill., on Mississippi River, 32 mi. below Burlington. Railroad, A. T. & S. F. It is the center of a farming and grape growing district. The Mormons established the town in 1840, and in 1846 the population was 15,000. A large and imposing temple, built of polished marble, was erected, but after the murder of Joseph Smith and the expulsion of his followers, it was destroyed. Pop. 1900, 1,321.

Navajo Indians (nä-vä'hō), a tribe of American Indians numbering 17,204, many of whom are engaged in civilized pursuits. They occupy a reservation in the northwest of New Mexico and the northeast of Arizona.

Naval Schools, U. S.—The U. S. Naval Academy at Annapolis, Md., was founded in 1845, for the education of the executive officers of the U. S. Navy. The course covers a period of six years, the last two to be spent at sea. The age of admission is from fifteen to twenty years. An act of Congress in 1902 provided for the appointment of a cadet every two years by each senator, congressman and delegate in Congress, and 11 by the president. In 1904 there were 653 cadets in the Academy and 73 instructors. President, Capt. W. H. Brownson.

Other U. S. Naval Schools are the Naval War College at New London, Conn., the schools for apprentices on Coast's Harbor Island, and on the Island of Yerba Buena in San Francisco Bay, and the Naval Institute at Annapolis.

Navarre (Spanish, *Navarra*), a former kingdom, now a province of Spain, between Aragon, Old Castile, and Biscay; area 4,045 sq. mi.; pop. 321,015. Extensive forests clothe the mountain slopes, but the lowlands produce wheat, maize, wines, oil, flax, hemp, and all sorts of leguminous plants, as well as abundant pastures for cattle of every description. Iron, copper, lead, etc., are among the minerals. The capital is Pamplona. The ancient kingdom of Navarre comprised both the modern Spanish province, sometimes called Upper Navarre, and also French or Lower Navarre, separated from the former by the Pyrenees, and now comprised in the departments of Basses Pyrénées and Landes. Ferdinand the Catholic annexed Upper Navarre to Castile in 1512, while the north portion ultimately passed, with Henry IV, to the crown of France.

Nave, in Gothic architecture, that part of a church extending from the western entrance to the transept, or to the choir and chancel, according to the nature and extent of the church.

Navel (or Umbili'cus), the aperture or passage in the abdomen which in the adult is normally closed, but in the fœtus or embryo gives passage to the umbilical vessels, by means of which the fœtus communicates with the parent through the placenta. The cicatrization or healing of the navel produces the contracted and depressed appearance so familiar in the external aspect of the structure.

Navigation, the science or art of conducting ships or vessels from one place to another. The management of the sails, rudder, etc., or the working of the ship generally, though essential to the practise of navigation, belongs rather to seamanship, navigation being more especially the art of directing and measuring the course of ships, the method of determining their position, etc., by the laws of geometry, or by astronomical principles and observations. In order to the accomplishment of this the ship must be provided with accurate charts of seas, plans of ports and harbors, etc., compasses, chronometer, sextant, log and log line, various mathematical instruments, leads and lead lines, log book, etc. It is by the compass that the direction in which the ship sails or should sail is determined. Though it points in a northerly direction, it does not generally point to the true north, but has a certain va-

riation which must be taken into account. The rate of speed at which a vessel is sailing is found by means of the log, which is heaved usually at the end of every hour. By noting the rate of sailing, the direction of the course, and the time occupied, the ship's position may be estimated, allowance being made for deviations caused by currents, and by the wind driving the vessel to leeward. The position thus determined is said to be found by dead reckoning. It is not safe to trust to dead reckoning for any length of time, and a more accurate method of finding the vessel's position at any time is required. This consists in taking observations of the heavenly bodies with the sextant, and these being compared with data given in the Nautical Almanac, while correct Greenwich time is given by the chronometer, the latitude and longitude, or true position, is easily found. In navigating a ship a certain knowledge of trigonometry is required; but the operations can be much shortened by tables and instruments. In directing a ship's course, and applying it on a chart, several methods of what are called *sailings* are employed, as plane sailing (the earth being regarded as having a plane surface), Mercator's sailing, great circle sailing (sailing on a great circle of the sphere), etc.

Navigation, Laws Regarding. — After the establishment of the independence of the U. S., it was natural that a spirit of retaliation should prevail in the framing of the navigation laws. Laws passed in 1790 and 1792 discriminated to such an extent in favor of American shipping as to give a monopoly of the foreign carrying trade. In 1815 a treaty was negotiated between the U. S. and Great Britain by which the ships of the two countries were placed reciprocally upon the same footing in the ports of the U. S. and Great Britain. The shipping act of 1884 places the sailing fleet of the U. S. on an equality with the vessels of other flags as regards the expenses of navigation. Consular fees are abolished, and consuls are paid by the government. Further payment of advance wages to seamen was prohibited. The "limited liability act" provides that the individual liability of a ship owner, for the ship's debts, except for wages due persons employed by the owners, shall be limited to the proportion of his interest.

Navy, a collective term for all the ships, or all of a certain class, belonging to a country. The term by itself means the whole of the ships of war belonging to a nation; or the whole naval establishment of any country, including ships, officers, men, stores, etc.

The highest rank in the active service is that of admiral, of which there are four gradations in the navy, viz., admiral of the fleet, admirals, vice admirals, and rear admirals. The command of each ship is entrusted to a captain or to a commander, according to the size of the ship. The combatant force in the navy is composed of two bodies of men, seamen and marines, and the officers under whose command they are placed are divided into three classes, viz., commissioned, warrant, and petty officers. Commissioned officers enter the navy usually after having been naval cadets (which see), being first appointed midshipmen and then sub-lieutenant, further promotion depending on circumstances. Warrant officers (who resemble the non-commissioned officers in the army) as gunner or boatswain, originally selected from among the seamen, are also occasionally promoted to commissions. The engineer branch of the service is now also a highly important one. It comprises the different ranks of assistant-engineer, engineer, chief-engineer, and inspector of machinery, all of whom are commissioned officers. To become an assistant-engineer a young man has first to pass a competitive examination, and undergo a preliminary training as an engineer student. Other non-combatants are surgeons, paymasters, and assistant-paymasters, naval instructors (who teach the midshipmen), clerks, etc.

The principal war navies in the world are those of Great Britain, France, the U. S., Germany, Italy, and Russia. The most important division of all navies now is their iron-clad fleet, but on account of differences in construction and armament, rate of speed, etc., it is not easy to institute an exact comparison between the navies of the different nations as regards their relative strength. The U. S. navy comprises 94 vessels, 46 of which are iron or steel, and 48 wooden vessels. Fourteen of these are armored, and 11 (including some now building) are powerful and swift armed cruisers. Several of the maritime powers have made arrangements by which they could convert some of the finest vessels of their mercantile navy into cruisers in case of war. As establishments connected with the navy may be mentioned dockyards both at home and abroad, the victualling yards, coaling stations, training establishments, and various places for gunnery and torpedo practise, naval hospitals, etc.

The principal merchant navies of the world are those of the United Kingdom, France, Germany, Norway, Italy, and the U. S.

Nazarenes', a designation given to the early Christians from the town of Nazareth, where Christ dwelt. The name was also applied to a sect which arose at the end of the first century, and existed chiefly in Egypt. They are supposed to have retained a judaizing adherence to the Mosaic law, and to have held a low opinion about the divinity of Christ.

Naz'areth, a small town in Palestine, 65 mi. n. of Jerusalem, celebrated as the residence of our Saviour during his youth. It is surrounded on all sides by hills. The houses are of stone, well built, with flat roofs. The principal edifices are the conventual buildings of the Franciscan monks, including the Latin Church of the Annunciation. Pop. about 3,000.

Naz'arites (or Nazirites), among the ancient Jews, persons who devoted themselves to the peculiar service of Jehovah for a certain time or for life. The law of the Nazarites (from the Hebrew *nazar*, to separate) is contained in Num. 6: 1–21.

Neap Tides, tides which happen in the middle of the second and fourth quarters of the moon. They are the lowest tides. See *Tide.*

Nebraska (ne-bras'ka), located in the geographical center of the U. S., is bounded on the n. by South Dakota, on the e. by Iowa and Missouri, on the s. by Kansas and Colorado, on the w. by Colorado and Wyoming. Its width is 208 m., length 412 m., gross area 76,794 sq. m. Pop. 1900, 1,068,539, of which 6,269 were Negroes and 3,322 Indians.

Surface.—Nebraska is a plateau which slopes toward the e. The mean elevation is 2,600 ft. Scott's Bluff near the north fork of the Platte river, with an elevation of 6,000 ft., is the highest point. In the n. and n. w. part of the state are high ridges, canyons and lofty hills with precipitous slopes. Twenty-five per cent of the surface is composed of well-watered valleys. The principal streams are the Missouri, flowing for five hundred miles along the e. border; its tributaries, the Platte, the Niobrara and the Nemaha; the Republican river, which drains the s. e. region; and the Big Blue and Little Blue, which, with the Nemaha, drain the s. w. The Platte flows across the state from w. to e. and has an entire course of 1,200 m. There are about 100 small lakes and numerous springs. The water-power is enormous. In the n. w. are the Bad Lands, consisting of hard clay. They form the most famous fossil region now known.

Climate.—The climate is agreeable, exhilarating and salubrious. The atmosphere is dry and pure and gentle winds prevail. As the air is dry, the cold of winter is not felt so keenly, and breezes constantly modify the summer's heat. The mean annual temperature at Kearney for 15 years was 47.53°. But the thermometer has been known to register 32° below zero in winter and 114° in summer. The average rainfall varies greatly in different portions of the state. In 1901, the average was 22.76 in.

Mining.—The state possesses a very limited quantity of mineral deposits. The most valuable are limestone and clay. Good sandstone is quarried in several places. In the southeastern counties are light veins of coal.

Agriculture.—The people are engaged chiefly in agricultural pursuits. There are 121,600 farms in the state, occuping 60.8 per cent of the total land area. The average size of farms is 246 acres and the average value $4,753. Corn is the most valuable product; but wheat, oats, barley, rye, potatoes and hay are raised in abundance. Sugar beets, sorghum and broom corn, buckwheat, alfalfa, hemp and flax are also profitably raised. Stock raising is carried on extensively. In 1900, the value of all livestock was about $150,770,000. Horses, mules, cattle and hogs are bred on most farms, but it is on the great ranches that the largest herds of horses, cattle and sheep are produced. Nebraska is destined to be one of the greatest dairy states in the Union. Both soil and climate are, for the most part, well adapted for the growth of large varieties of fruit and vegetables. The poultry business is one of increasing importance. Considerable attention is paid to forestry.

Manufactures.—The census reports of 1900 show a considerable growth in the manufacturing interests of Nebraska during recent years. The lack of cheap fuel has hitherto hindered manufacturing, but this difficulty has been overcome by the development of coal fields in Iowa, Kansas and Missouri. Industries: Slaughtering and meat-packing, manufacture of dairy products, flouring and grist-mill products, printing and publishing, car construction, saddlery and harness making, planing mills, brick and tile making, beet sugar, and at Omaha, one of the most complete establishments in the United States for smelting, separating and refining ores of gold, copper, silver, lead and zinc. South Omaha is the chief manufacturing city.

Transportation.—The fine natural road-beds offer excellent facilities for transportation. Water is the great destroying element in any system of highway construction. Railroads penetrate into eighty-five of the ninety counties of the state, having an aggregate mileage of 5,738. The leading railroads are: C., & B. Q., C. R. I. & P., Neb. divisions of the Northwestern; Sioux City & Pacific, Burlington & Missouri R., Kansas City, St. Joseph & Council Bluffs, and the Union Pacific, which traverses the entire state from e. to w. The Missouri, the only navigable river in the state, is not used at present to any great extent. The trade by rail is extensive.

Education.—When Nebraska was organized liberal provision was made for establishing a permanent school fund. It now has the smallest per cent of illiteracy of any state in the Union. The State University at Lincoln maintains a high standard of scholarship. Other educational institutions are University of Omaha, Bellevue; Creighton University, Omaha; Nebraska Wesleyan University, University Place; Doane College, Crete; and a state normal school at Peru. There are numerous state and private charitable institutions.

History.—Nebraska was visited by Coronado as early as 1541; in 1673, the Platte and Missouri districts were mapped out by Marquette. It formed a part of the Louisiana purchase of 1803. In 1804–1805, it was visited by Lewis and Clarke. In 1847, the first settlement by whites was made at Bellevue; in 1854, Nebraska was established as a territory including part of Dakota, Montana, Wyoming and the n. e. portion of Colorado. In 1863, it was reduced to its present limits. Nebraska became a state in 1867 and Lincoln was made the capital in the same year. Since the construction of the Union Pacific railroad (1862), the state has had almost continuous prosperity. The principal cities, with population in 1900, are Lincoln, the capital, 40,169; Omaha, 102,555; South Omaha, 26,001.

Nebraska City, Otoe co., Neb., on Missouri River, 50 mi. s. of Omaha. Railroads: B. & M.; K. C.; St. J. & C. B.; C. B. & Q.; and Missouri Pacific. Industries: starch works, cereal mills, flouring mills, iron foundry, agricultural implement, cigar, cooperage, boiler, windmill, carriage, canning, and other factories, distillery, two breweries, and brick co. Sur-

rounding country agricultural and fruit-growing. The town was first settled in 1854 and became a city in 1855. Pop. 1900, 7,380.

Nebraska, University of, a state institution of higher learning at Lincoln, Neb., founded in 1869. It comprises the Graduate School, the College of Literature, Science and Arts, the Industrial College, the College of Law, the College of Medicine, the School of Fine Arts, and the School of Music. It maintains a summer session and has intrusted to its charge the United States Agricultural Experiment Station, the State Museum, the Botanical and Geological Surveys and the superintendency of farmers' institutes. In 1904 the faculty numbered 200 instructors and the students 2,560. The library contains about 60,000 volumes. The president is E. Benjamin Andrews.

Nebuchadnezzar, King of Babylon from 604 to 561 B. C ; the son of Nabopolassar. After defeating Necho, King of Egypt, he subjugated Syria and Palestine, carrying off with him the sacred vessels of the temple and the chief Jews into captivity. He destroyed Tyre in 585, and some years later he invaded and ravaged Egypt. During the peaceful years of his reign he rebuilt in a magnificent manner Babylon and many of the other cities of the empire, and constructed vast temples, aqueducts, and palaces, whose ruins still testify to his grandeur. Several inscriptions relating to his reign have recently been found.

Neb'ula (pl. Nebulæ), in astronomy, the name given to certain celestial objects resembling white clouds, which in many cases, when observed through telescopes of sufficient power, have been resolved into clusters of distinct stars. As more and more powerful telescopes have been employed, the number of resolvable nebulæ has become greater and greater, and it is probable that many nebulæ irresolvable at present may yet be shown to be star clusters in telescopes more powerful than those now employed. On the other hand, the spectroscope has shown that many nebulæ, among which are several that had hitherto appeared to be well authenticated clusters, consist, in part at least, of masses of incandescent gas. The recent researches of Mr. Norman Lockyer render it probable that nebulæ include clouds of meteors, which, by their continual impact against one another, produce the heat, light, and gaseous matter that are detected by our telescopes and spectroscopes.

Nebular Hypothesis, a theory by means of which Laplace (before the existence of nebulous matter in the universe had been discovered by means of the spectroscope) accounted for those features of the solar system which must be regarded as accidental in the Newtonian philosophy. This theory supposes that the bodies composing the solar system once existed in the form of a nebula; that this had a revolution on its own axis from west to east; that the temperature gradually diminishing, and the nebula contracting by refrigeration, the rotation increased in rapidity, and zones of nebulosity were successively thrown off in consequence of the centrifugal force overpowering the central attraction. These zones being condensed, and partaking of the primary rotation, constituted the planets, some of which in turn threw off zones which now form their satellites. The main body being condensed toward the center, formed the sun. The theory was afterward extended so as to include a cosmogony of the whole universe, and though open to certain objections, is now generally received by astronomers.

Necho (or Neku), a king of Egypt, mentioned in 2 Kings 23:29 and Jer. 46:2. He belonged to the twenty-sixth dynasty; succeeded his father Psammeticus I, and reigned from B.C. 610 to 594. He extended his dominions from the south of Syria to the Euphrates; defeated Josiah king of Judah at Megiddo, but was ultimately driven back by Nebuchadnezzar.

Neck, See *Anatomy.*

Necker, Jacques (1732–1804), French minister of finance. He became clerk in a Paris banking house in 1750, and afterward accumulated a large fortune as a banker. In 1776 he received an appointment to the treasury, the direction of which he retained for five years. Malversation under the preceding reign had caused a large deficit, to which the American war made great additions. Necker endeavored to meet the exigency by loans and reforms, and above all to fund the French debt and establish annuities under the guarantee of the state. His suppression of abuses had created him many enemies at court, and shortly after the publication of his famous *Compte Rendu,* he resigned and retired to Switzerland. The errors of Calonne, who next had the management of the state finances, increased Necker's reputation; and in 1788 he was recalled as comptroller general. The states general were summoned to meet on May 1, 1789; but not long after the advisers of the king succeeded in inducing him to give Necker his dismissal, and to order him to leave the kingdom. No sooner was his removal known than all Paris was in a ferment. The storming of the Bastile followed (July 14), and the king found himself compelled to recall the banished minister. His return to Paris resembled a triumphal procession. His first object was to restore tranquillity and security of person and property. But he was not equal to the political or even the financial crisis, and resigned in September, 1790. Necker's daughter was the well-known Madame de Staël.

Nec'romancy, the divination of the future by questioning the dead. This superstition originated in the East, and is of the highest antiquity. We find mention made of necromancy in the Scriptures, where it is strongly condemned. In the *Odyssey* Homer has made Ulysses raise the shade of Tiresias from the infernal regions. In many parts of Greece there were oracles of the dead, the origin of which is lost in the obscurity of history. Although this practise has been condemned by the Christian church from the very first, it has not yet entirely ceased. Modern spiritualism embodies

all the elements of necromancy. The term is often extended so as to include the general art of magic.

Necrop'olis (literally, "city of the dead"), a name originally applied to a suburb of Alexandria devoted to the reception of the dead, and hence extended to the cemeteries of the ancients generally. The name has also been given to some modern cemeteries in or near towns.

Necro'sis (literally, "mortification"), a medical term signifying the death of the bone substance. It is a condition of the bone substance corresponding to what gangrene is in the soft parts, thus distinguished from *caries*, which corresponds to ulceration in the soft parts. Necrosis is usually a result of inflammation of the bone, and is often attributed to cold, but frequently it is due to constitutional disease.

Nectar, in Greek mythology, the drink of the gods, which was imagined to contribute much toward their eternal existence. It was said to impart a bloom, a beauty, and a vigor which surpassed all conception, and together with ambrosia (their solid food) repaired all the decays or accidental injuries of the divine constitution.

Nec'tarine, a fruit which differs from the peach only in having a smoother rind and firmer pulp, being indeed a mere variety of peach. See colored plate, Fruit—Apple,

Nectocalyx, in zoology, the swimming bell or disk of a medusa or jellyfish, by the contractions by which it is propelled through the water.

Needle, a small instrument of steel, pointed at one end, and having an eye or hole in it through which is passed a thread, used for sewing. From very ancient times needles of bone, ivory, wood, and bronze have been used. The chief of the ordinary operations that a sewing needle goes through in their proper order are such as follow: The cutting of the steel wire into lengths sufficient for two needles; the pointing of these at both ends on a grindstone by fifty or sixty at a time; the cutting of each length through the middle to give two needles; the flattening of the heads by a blow with a hammer; the piercing of the eyes with a punch applied first on one side then on the other; the trimming of the eyes; the grooving and rounding of the head; hardening, tempering, straightening; polishing, which is done by making up some 500,000 needles into a cigar-shaped bundle along with emery and oil and rolling them backward and forward under a weight. Modifications of the ordinary sewing needle are used in the various forms of sewing machines, in sailmaking, bookbinding, glove making, darning, stay making, etc. The name is also applied to implements of iron or steel, bone, wood, etc., used for interweaving or interlacing a thread or twine in knitting, netting, embroidery, jacquard loom weaving, etc., and formed in various ways; according to the purpose for which they are intended; as also to sundry long and sharp pointed surgical instruments, some employed for sewing, others for other purposes. The small piece of steel pointed at both ends and balanced on a pivot, as in the magnetic compass and some forms of telegraphic instruments, is also called a needle, and the term is used for various other objects.

Needle Gun, a breech-loading rifle the cartridge of which contained a small quantity of detonating powder which was exploded by the rapid darting forward of a needle or small spike. It is now superseded by weapons of superior efficiency.

Needle Ore, acicular bismuth glance; native sulphide of bismuth, lead, and copper occurring imbedded in quartz in long, thin, steel-gray crystals, marked with vertical striæ, and apparently in four or six sided prisms. It consists of lead 35.8, copper 11, bismuth 36.7, and sulphur 16.5, and usually accompanies native gold.

Neenah, Winnebago co., Wis., at head of Fox River 35 mi. n. of Fond du Lac. Railroads: Wis. Cent.; C. & N. W.; Mil. & Northern. Industries: paper mills, flour mills, stove foundries, plow factories, machine shops, etc. Pop. 1900, 5,954.

Negapatam', town and chief port, Tanjore District, Madras Presidency. It was an early settlement of the Portuguese; was taken by the British in 1781. Pop. 53,855.

Negaunee, Marquette co., Mich., 12 mi. w. of Marquette. Railroads: D. S. S. & A.; C. & N. W., and L. S. & I. Industries: iron mining, there being nine mines in operation. The town was first settled in 1855 and became a city in 1873. Pop. 1900, 6,935.

Negligence, in law, the omission to do that which ought to be done. When such want of care results in injury to another, or involves a wrong done to society, it renders the party guilty of negligence liable to either an action for damages or trial for misdemeanor. In law there are recognized three degrees of negligence; *ordinary*, the want of ordinary care or diligence; *slight*, the want of great care or diligence; and *gross*, the want of slight care or diligence. The person charged with negligence must have been under an obligation to exercise care or diligence either assumed by contract or imposed by law. An alleged act of negligence must always be the proximate cause of the injury sustained; but any injury caused to a person by another who at the time is exercising due care is not actionable. The question of negligence is usually one for a jury, and the onus of proof rests on the pursuer, except when the thing resulting from the negligence speaks for itself. A master is responsible for the negligence of his servants, but in no case can redress be had where contributory negligence on the part of the pursuer is proved.

Negri'tos (or Negrillos), the name given to several negro-like races inhabiting the islands, etc., of Southeastern Asia, and often confounded with the Papuan race. The chief tribes are the Aëtas, the indigenous people of the Philippine Archipelago, still inhabiting the interior of the islands of Luzon, Negros, Panay, Mindoro, and Mindanao; the Samangs of Ma-

acca; and the Mincopies inhabiting the Andaman Archipelago. They are dwarfish in stature averaging from 4 ft. 6 in. to 4 ft. 8 in. in height; the nose small, flattened or turned up at the apex, and the hair soft and frizzled. The various tribes speak distinct and mutually unintelligible dialects.

Negroes, a race of the human species indigenous to the African Soudan, though the term is often extended so as to cover all the tribes inhabiting Africa from the southern margin of the Sahara as far as the territory of the Hottentots and Bushmen, and from the Atlantic to the Indian Ocean. These tribes are all dark colored, yellow, copper-red, olive, or dark brown, passing into ebony-black. The typical negro, however, is described as having a black skin, woolly or crisp hair, a protuberant mouth with thick lips, nose thick and flat, thick narrow skull, flat and receding forehead, hair of the face scanty, thorax compressed, flat buttocks, long arms, knees bent outward, calves weak, and feet comparatively flat with long heels. The brain, though essentially similar to that of the white races, is not so large, averaging about 5 ounces less than that of the white man. The negro as a rule differs as much from the whites in mental as in physical characteristics, though there are many individual exceptions. He is very receptive, and in that which requires imitation he is well developed, but in that which requires independent thought he stands on a low stage. He has less nervous sensibility than the white man, and can flourish in climates fatal to the higher races, and the race does not diminish in contact with civilization. Certain negro tribes of Africa present a surprising picture of barbaric civilization from contact with Mohammedanism. The slave system has alienated great numbers of negroes from their native country, mostly to America and the West India Islands, where there has been considerable intermixture of races. By the last census there were 7,470,040 persons of African descent in the U. S. many of whom hold good positions in life, as negroes also do in the West Indies and elsewhere.

Negro Minstrelsy, a species of music of a quaint and simple kind, which originated among the negroes of the Southern U. S., and was first made popular at public entertainments by E. P. Christy, the originator of the troupes of imitation negro musicians. The words of the songs are generally in broken English, and the harmonies almost entirely limited to the chords of the tonic and dominant. The bones and banjo are the chief accompanying instruments.

Negros, an island of the Asiatic Archipelago, belonging to the Philippines; area about 3,800 sq. mi. In the central mountainous part of the island are a considerable number of Negritos, but the inhabitants are chiefly Malays. Sugar is the chief product. Pop. 145,000.

Negus, a drink made of port or sherry wine mixed with hot water, sugar, nutmeg, and lemon juice; so called from Colonel Negus, the inventor.

Nehemi'ah, a distinguished and pious Jew, who was b. in captivity, but was made the cup-bearer of Artaxerxes Longimanus, king of Persia. He was sent, B. C. 444, as governor to Jerusalem, with a commission to rebuild the walls and gates of this city. He accomplished his purpose, but not without difficulties, arising partly from the poverty of the lower classes of the people, and partly from the opposition of the Ammonites and other foreign settlers. The book of Nehemiah contains Nehemiah's account of his proceedings, with other matter which forms a supplement to the narration contained in the book of Ezra.

Neith (or Neitha), an Egyptian goddess who was worshiped especially as a local divinity at Saïs in Lower Egypt. She had some of the characteristics of the Greek Athēnē or Minerva.

Nejin (Niejin or Nyeshin), a town in Russia, in the government of Czernigov, on the left bank of the Oster, about 80 mi. n. e. of Kiev. Pop. 43,030.

Nellor, a town in India, in the presidency of Madras, capital of district of the same name. Pop. 27,505. The district lies on the Coromandel coast; area 8,739 sq. mi. It is famous for its breed of cattle. Pop. 1,220,236.

Nelson, a town and provincial district in New Zealand, in the n.w. of South Island. Leather making, brewing, fruit preserving, etc., are among the industries. Steamers ply regularly to all the neighboring ports. Pop. including suburbs, 10,900. The district has an area of 10,468 sq. mi. Although agriculture is now carried on to a considerable extent, still the great wealth of the district lies in its minerals. Unlimited beds of excellent iron ore, lead, and copper ores, coal, and gold, both alluvial and quartz, are all worked to a considerable extent. Pop. 30,203.

Nelson (or Nelson in Marsden), a town in N. E. Lancashire, England, 3½ mi. n.e. of Burnley. There are various manufactories, and coal is worked in the neighborhood. Pop. 22,700.

Nelson, HORATIO, VISCOUNT (1758–1805), a great British admiral, was b. at Burnham Thorpe, in Norfolk. At the age of twelve he entered the navy as a midshipman, and in 1773 accompanied Commodore Phipps in an expedition toward the north pole. In 1777 he was made a lieutenant, and in 1779 raised to the rank of post captain. He afterward commanded the *Boreas* frigate, and was employed to protect the trade of the Leeward Islands. On the commencement of the war with the French Republic he was made commander of the *Agamemnon*, of sixty-four guns, with which he joined Lord Hood in the Mediterranean, and assisted at the siege of Bastia. For his gallantry at the battle of Cape St. Vincent (Feb. 14, 1797), he was made rear admiral of the blue, and appointed to the command of the inner squadron at the blockade of Cadiz. His next service was an attack on the town of Santa Cruz, in the Island of Teneriffe. In 1798 he joined Lord St. Vincent (Admiral Jervis), who sent him to the Mediterranean to watch the progress of the armament at Toulon. In

1801 he was employed on the expedition to Copenhagen under Sir Hyde Parker, in which he effected the destruction of the Danish ships and batteries. When hostilities recommenced after the Peace of Amiens Lord Nelson was appointed to command the fleet in the Mediterranean, and for nearly two years he was engaged in the blockade of Toulon. In spite of his vigilance the French fleet got out of port (March 30, 1805), and being joined by a Spanish squadron from Cadiz sailed to the West Indies. The British admiral hastily pursued them, and they returned to Europe and took shelter at Cadiz. On October 19, the French, commanded by Villeneuve, and the Spaniards by Gravina, ventured again from Cadiz, and on the 21st they came up with the British squadron off Cape Trafalgar. An engagement took place, in which the victory was obtained by the British, but their commander was wounded in the back by a musket ball, and shortly after expired. His remains were carried to England and interred in St. Paul's Cathedral.

Nelson River, a river of Canada, which issues from Lake Winnipeg, and after a tortuous course of about 350 mi., during which it passes through a series of lakes, falls into Hudson's Bay. Numerous rapids and falls retard navigation.

Nelum'bium, a genus of aquatic plants inhabiting the fresh waters of the temperate parts of the world, having large polypetalous flowers with numerous stamens. The best known species is the Hindu and Chinese lotus, a magnificent water plant of the rivers and ditches of all the warmer parts of Asia, the Malay Archipelago, Australia, and also found in the Nile (formerly at least). The numerous canals of China are filled with it, its tubers being there used as a culinary vegetable. It is a most beautiful plant, with peltate leaves and handsome rose-colored flowers on tall stalks, and is frequently cultivated in hothouses. In Asia it is generally deemed sacred, and figures in religious rites. *N. luteum*, the yellow water bean of the Southern U. S., has starchy rhizomes, with tubers like those of the sweet potato, which are used for food.

Nelumbium.

Nematel'mia, the division of Scolecida that includes those parasitic worms which possess bodies of rounded or cylindrical shape. Among the most familiar are the *Gordiacĕa*, or "Hair worms." These possess slender hair-like bodies, and are found as parasites in the interior of beetles and other insects, during the first stages in their development. On arriving at sexual maturity they escape from the bodies of their hosts and seek the water of pools, in which the eggs are deposited in the form of lengthened chains. The embryos produced from these ova are provided with a retractile proboscis and hooks, by means of which they penetrate the bodies of insects, and there develop into the sexually mature worms. Superstition formerly credited horsehair, introduced into water, with the remarkable property of becoming transformed into these living creatures. Another order of the Nematelmia is that of the *Nematōda;* which includes several familiar forms as the *Ascăris*, or common "roundworm" of the human intestines; the *Trichīna*, famous for its fatal effects in man; the *Filaria* or "Guinea worm." The Nematoda, although mostly parasitic, also comprise many free and non-parasitic forms.

Nemat'ocyst, in physiology a "thread-cell" of the Cœlenterata, that is, a cell or minute, in the interior of which is a long filament sac, often serrated or provided with spines, and capable of being swiftly protruded. It is to their nematocysts that the power of stinging possessed by many of the Cœlenterata is due.

Neme'an Games, ancient Greek games, held in the valley of Nemea in Argolis, where Hercules is said to have killed the Nemean lion. They recurred ordinarily every second year, and were similar in character to the other Greek games. Eleven of Pindar's odes are in celebration of victors at the Nemean games.

Nemer'tida, a group of the Scolecida (Annuloida), represented by the "ribbon worms" found on the sea coasts of various countries. They possess flat, ribbon-like bodies, which, may attain a length of more than 15 ft. Some of the species of the type genus *Nemertes* attain a length, in their extended state, of 30 or 40 ft., which they can suddenly contract to 3 or 4 ft.

Nem'esis, a female Greek divinity who appears to have been regarded as a personification of the righteous anger of the gods, inflexibly severe to the proud and insolent, i. e., retributive justice. In the theogony of Hesiod she is the daughter of Night, the avenging Fate who checks and punishes the favorites of Fortune.

Ne'ogene, in geology, a name given by some geologists to the Pliocene and Miocene tertiaries, to distinguish them from the older Eocene strata.

Neolith'ic, in archæology, a term applied to the more recent of the two periods into which the Stone Age has been subdivided as opposed to *palæolithic*. During this period there is found no trace of the knowledge of any metal excepting gold, which it would seem had sometimes been used for ornaments. The Neolithic stone implements are finely shaped and polished, and are found in connection with the remains of extinct animals.

Ne'ophron, a genus of birds of the vulture

family, one species of which inhabits Southern Europe, Egypt, and Asia. It is known as the Alpine or Egyptian vulture, Pharaoh's chicken, etc.

Neotrop'ical, a term applied to one of the six regions into which zoologists divide the surface of the earth, based on their characteristic fauna or collection of animal life. The Neotropical region includes Central America south of the Isthmus of Tehuantepec, and South America.

Neot'tia, a small genus of Orchidaceæ, readily distinguished by its habit, all the species being leafless, brown-stemmed plants, with sheathing scales in place of leaves. One species, the bird's-nest orchis, is a native of Britain.

Nepal' (Nipal', or Nepaul'), a small independent state situated on the northeast frontier of Hindustan; area 54,000 sq. mi. It contains within its boundaries the highest mountains in the world—Mount Everest, Dhawalagiri, and on its eastern borders Kanchinjinga. The principal products are rice, wheat, barley, pulse, sugar cane, buckwheat, hemp, cotton, tobacco, and madder. Pasturage is on the whole scarce and indifferent. The sheep and goats, however, have fine wool. Horses are imported from Thibet. The wild animals are elephants, black bears of great size, hogs, hog-deer, foxes, jackals, and a few tigers. The manufactures of Nepal are confined chiefly to coarse cotton cloth. Pop. 2,000,000.

Nepen'the, a drug which was fabled by the ancient poets to banish the remembrance of grief and to cheer the soul. It is thought by many to have been opium.

Neph'elin (or Neph'elite), a mineral found mixed with other substances, in plutonic or volcanic rocks, in small masses or veins, and in hexahedral crystals. It is usually white or yellow.

Nephrite, a mineral, an aluminous variety of amphibole among the bisilicates, of a leek-green color, massive, and in rolled pieces, remarkable for its hardness and tenacity. It was formerly worn as a remedy for diseases of the kidneys. An unisilicate zoisite, is also spoken of as nephrite, as is jade. All three are capable of fine polish, and have been used since prehistoric times for ornaments, weapon handles, and even weapons.

Nephthys, an Egyptian deity, the wife of Seth. Her proper sphere was the nether world, though she occurs in the upper world as the instructress of Horus. She is associated as one of a tetrad with Osiris, Isis, and Horus. She was called by the Greek writers *Teleutē* (End), *Aphroditē*, and *Nikē* (Victory).

Neptune, the chief marine divinity of the ancient Romans. When the Greek mythology was introduced into Rome he was completely identified with the Greek Poseidōn, all the traditions relating to whom were transferred by the Romans to their own deity. In art he is usually represented as armed with a trident, and the horse and the dolphin are his symbols.

Neptune, in astronomy, the most distant of the known planets, its mean distance from the sun being 2,745,998,000, mi., and its least distance from the earth 2,629,000,000 mi. The eccentricity of its orbit is .00872; its inclination to the plane of the ecliptic is 1° 47′. Its apparent diameter is about 2.7″. Its real diameter is estimated at 36,600 mi., and it seems to have very little polar compression. Its mass is about 16¾ times that of the earth, and it revolves round the sun in 164.6 years. It has one satellite, whose period is 5 da. 21 hrs. 2 min. 44 sec., and whose mean distance from the planet is 230,000 mi. Neptune was discovered in 1846 in a position indicated independently by Leverrier and Adams, and deduced from a series of recondite mathematical calculations to find a body which could account for the long observed perturbations of Urănus.

Nerbudda (or Narbada) (*nar-ba-dä*), a river of Hindustan, course 800 mi. In religious sanctity it ranks second only to the Ganges. Nerbudda is also the name of a division of the Central Provinces of India; area 17,513 sq. mi.; pop. 1,763,105.

Ne'reïds, in classical mythology, sea nymphs, daughters of Nereus and Doris, and constant attendants on Poseidon or Neptune. They are represented as riding on sea-horses, sometimes with the human form entire, and sometimes with the tail of a fish. They were distinguished on the one hand from the Naiads or the nymphs of fresh water, and on the other hand from the Oceanides or nymphs of the ocean.

Ne'reïs, a genus of dorsibranchiate annelids, consisting of worm-like animals with long segmented bodies, antennæ or feelers, eyes when distinct four in number; mouth usually with horny jaws. Some of the species are found in most seas. One species, *N. prolifĕra*, propagates by spontaneous division, the hind part of the body being gradually transformed into an additional animal.

Nereocys'tis, a seaweed, found on the northwestern shores of America and opposite shores of Asia, remarkable for the stems, which attain the length of 45 fathoms, swelling at the top into large cysts or bags filled with liquid; these becoming entangled form large floating islands on which sea otters rest.

Nereus (nē'rūs), in classical mythology, an inferior divinity of the sea, the progenitor of the Nereïds, a god subordinate to Poseidon (Neptune). In the ancient works of art, and also by the ancient poets, he is also represented as an old man, with a wreath of sedge, sitting upon the waves with a scepter in his hand.

Nergal, the god of war among the ancient Babylonians.

Nero, Lucius, Domitius Ahenobarbus (A. D. 37–68) (after his adoption by the Emperor Claudius called *Nero Claudius Cæsar Drusus Germanicus*), Roman emperor, the son of Cneius Domitius Ahenobarbus and Agrippina, the daughter of Germanicus. He was b. at Antium, and after the marriage of his mother, in third nuptials with her uncle, the emperor Claudius, was adopted by that prince, and married to his daughter Octavia. When Nero was about seventeen years of age his abandoned mother poisoned her husband, Claudius, and succeeded

in raising her son to the throne, over whom she expected to exercise the most absolute control. Nero became emperor in 54, and the year following disposed of the rightful heir, Britannicus, by poison. For the first few years his public conduct, under the control of Burrhus and Seneca was unexceptionable; in private, however, he disgraced himself by the most odious vices, and his mother endeavored to retain her influence by shamefully complying with his inclinations. In 59 Nero caused this detestable woman to be murdered, and then, fearing no rival in power, gave full scope to the darkest traits of his character. In 62 he repudiated his wife Octavia. In 64 the burning of Rome occurred, which has been charged, with great probability, upon Nero himself, who, however, accused the Christians of the act, and made it an occasion of the most dreadful cruelties toward them. His debaucheries and cruelties occasioned an almost general conspiracy against him, known as that of Piso, in 65, the discovery of which led to more tortures and bloodshed. The revolt of Vindex was also suppressed. That of Galba in 68 succeeded, and Nero escaped arrest by stabbing himself, being then in the thirty-first year of his age and the fourteenth of his reign. He was a lover of arts and letters, and possessed much taste as a poet and histrionic performer.

Nerthus, an ancient German goddess, regarded as representing the earth.

Nerva (A. D. 32–98), the successor of Domitian, and one of the most virtuous of the Roman emperors. He was twice consul, and was elected emperor on the death of Domitian in 96. He adopted Trajan, who succeeded him.

Nerve (Nervous System).—A nerve is one of the fibers which proceed from the brain and spinal cord, and from the central ganglia of lower animals, and ramify through all parts of the body, and whose function is to convey impulses resulting in sensation, motion, secretion, etc. The aggregate of these nerves, and the centers from which they proceed, form the nervous system, the medium through which every act or detail of animal life is inaugurated and directed. See *Anatomy.*

Nervii, an ancient people of Galla Belgica, famous for the stand they made against Cæsar's advance in B.C. 57 and 54. They submitted to the Romans in B.C. 53. Their territory was coextensive with the old diocese of Cambrai.

Nervous Diseases are diseases due either to actual changes in the structure of nerve fibers or nerve centers, or to some irregularity of nerve function without actual structural change. Thus nervous diseases may be due to inflammation or degeneration of nerve substance; to the pressure on some part of the nervous system of tumors, effused blood, or other fluid; to the death of some part by the cutting off of its blood supply, etc.; or may be the result of lowered nervous action as a part of general bad health.

Nervures, in entomology, the corneous tubes which form prolongations of the tracheæ or air vessels of insects, and which help to expand the wing and keep it tense. The term is applied in botany to the veins or nerves of a leaf.

Nest, the abode or habitation, varying greatly in form, materials, and situation, constructed by birds chiefly for the purposes of incubation and the rearing of the young. The nests of birds are of the most diverse character, some birds making little or no nest, while others construct receptacles for the eggs requiring a vast amount of skill and industry. The materials used are also extremely various, being such as mud or clay, twigs or branches, leaves, grass, moss, wool, feathers, etc. Some birds, for the sake of protection, excavate burrows in banks or sandy cliffs in which to make their nests. Many mammals also are nest builders, notably mice, moles, dormice, squirrels, foxes, weasles, badgers, rabbits, etc.; and nests are also constructed by certain fishes, reptiles, crustaceans, insects, etc.

Nestor, one of the Greek heroes at Troy, son of Neleus, king of Pylos. He took part in the hunting of the Calydonian boar, and in the Argonautic expedition. He is noted as the wisest adviser of the chiefs before Troy, after the fall of which he retired to Pylos, where he lived to a great age.

Nestorians, a Christian sect of Western Asia, named from their founder Nestorius. They denied the union of the divine and human natures in Christ, holding that he possessed two distinct personalities, the union between which was merely moral. After the Council at Ephesus the Nestorians were driven by imperial edicts into Persia, where they firmly established themselves. The greater number of their churches perished under Timur's persecutions. Most of the survivors were converted to Catholicism and are now known as Chaldeans. The remnant of the sect lives in Persia and Turkey and numbers about 70,000.

Net, a term applied to that which remains of a weight, quantity, etc., after making certain deductions. Thus *net weight* is the weight of merchandise after allowance has been made for casks, bags, or any enclosing material.

Net, an open fabric made of thread, twine, or cord, woven into meshes of fixed dimensions, firmly knotted at the intersections. Nets are used for a great variety of purposes; as for protecting fruit trees, for collecting insects, for hammocks, screens, etc., but chiefly for hunting and fishing. The chief kinds of nets used in fishing are the trawl, the drift, the seine, the kettle or weir, and the trammel or set nets. The trawl is a triangular bag with an arrangement for keeping its mouth open, drawn along the bottom of the water. The drift and seine nets are very long in proportion to their breadth, and differ from one another only in the manner in which they are employed. The seine has a line of corks along one of its long borders, and a line of leaden weights along the other; so that when thrown into the water it assumes a perpendicular position. It is used near the shore, being dragged to land with any fish it may enclose, by ropes fastened to the ends. The drift net is not loaded with

lead, but floats in the water, and is used especially in herring fishing, the fishes as they drive against it becoming caught by the gills. Kettle and weir nets are structures fixed on stakes placed along the coast between high and low water. Trammel or set nets are also fixed between stays, but act like drift nets. Formerly all nets were made by hand, but since 1820, when James Paterson established a machine-net factory at Musselburgh, hand-made nets have been superseded. Wire nets are used for garden purposes, for hen coops, etc.

Netherlands, THE (or Holland, in Dutch Nederland, or Koninkrijk der Nederlanden), a kingdom of Europe which lies on the North Sea, n. of Belgium and w. of part of Northern Germany. Area, 12,648 sq. mi.; pop. 1901, 1,103,224. The country is divided into 11 provinces: North Brabant, Gelderland, South Holland, North Holland, Zealand, Utrecht, Friesland, Overijssel, Groningen, Drenthe, and Limburg. The king is also sovereign (grand-duke) of the grand-duchy of Luxemburg. In addition to her European territories Holland possesses extensive colonies and dependencies in the Asiatic Archipelago and America; including Java, Sumatra, great part of Borneo, Celebes, part of New Guinea, Surinam or Dutch Guiana, the West Indian islands of Curaçoa, Saba, St. Eustatius, etc. Colonial pop. est. 1897, 34,090,000.

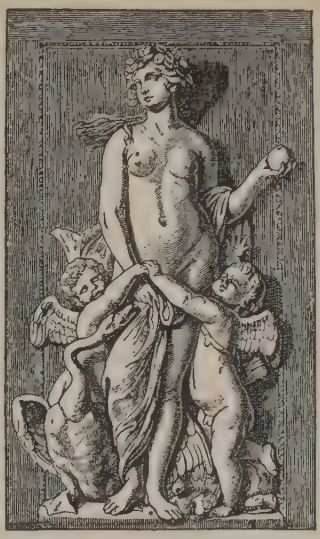
General Features.—The Netherlands (or Low Countries, as the name implies) form the most characteristic portion of the great plain of Northern and Western Europe. It is the lowest part of this immense level, some portions of it being 16 to 20 ft. below the surface of the sea, and nearly all parts too low for natural drainage. The coast line is very irregular, being marked by the great inlet of the Zuyder Zee, as well as by various others, and fringed by numerous islands. In great part the coast is so low that were it not for massive sea dikes large areas would be inundated and lost to the inhabitants. In the interior also dikes are a common feature, being built to protect portions of land from the lakes or rivers, or to enable swampy pieces of land to be reclaimed by draining, the water being commonly pumped up by windmills. These enclosed lands are called *polders,* and by the formation of the polders the available area of the country is being constantly increased, lakes and marshes being converted into fertile fields, and considerable areas being even rescued from the sea. One of these reclamations was the Lake of Haarlem, the drainage of which, yielding more than 40,000 acres of good land now inhabited by some 12,000 persons, begun in 1839, was finished in 1852. Almost the only heights are the sand hills, about 100 to 180 ft. high, forming a broad sterile band along the coast of South and North Holland; and a chain of low hills, of similar origin perhaps, southeast of the Zuyder Zee. In the same line with the sand hills, extending past the mouth of the Zuyder Zee, runs a chain of islands, namely, Texel, Vlieland, Schelling, Ameland, etc., which seem to indicate the original line of the coast before the ocean broke in upon the low lands. The coast of Friesland, opposite to these islands, depends for its security altogether on artificial embankments. The highest elevation, 656 ft., is in the extreme southeast. The general aspect of the country is flat, tame, and uninteresting, and about a fifth of the whole surface consists of marsh, sand, heath, or other unproductive land.

Rivers and Canals.—The chief rivers of the Netherlands are the Rhine, Maas (or Meuse), Scheldt, and Ijssel. The Rhine is above half a mile wide where it enters the Netherlands; it soon divides, the south and principal arm taking the name of Waal and uniting with the Maas, while the north arm, communicating with the Ijssel, takes the name of Leck; a branch from it named the Kromme (crooked) Rhein, winds by Utrecht to the Zuyder Zee, while another very diminished stream called the Old Rhine flows from Utrecht by Leyden to the sea at Katwijk. The Maas, entering the Dutch Netherlands from Belgium, receives the Roer; of the Scheldt only the mouths, the east and the west, or Old Scheldt, lie within the Dutch boundary. The Ijssel, flowing from Germany, enters the Zuyder Zee. The navigable canals are collectively more important than the rivers. The chief are the North Holland Canal, between Amsterdam and the Helder, length 46 mi.; and the more important ship canal, 15 mi. long, 26 ft. deep and 197 wide, from the North Sea to Amsterdam, and connected by locks with the Zuyder Zee. Lakes are also very numerous.

Climate, Agriculture, etc.—The climate of the Netherlands is humid, changeable, and disagreeable. As regards rural industries gardening and agriculture have attained a high degree of perfection; yet the latter holds a subordinate place in rural industry. Wheat, of excellent quality, is grown only in favored portions of the south provinces. Rye, oats, and buckwheat, with horse beans, beet, madder, and chicory, are more common crops; and tobacco is cultivated in the provinces of Gelderland, South Holland, and Utrecht; flax in North Brabant, South and North Holland, Friesland, and Zeeland; and hemp, sugar beet, oil seeds, and hops in various parts of the kingdom. Culinary vegetables are cultivated on a large scale, not merely for the sake of supplying the internal demand, but also for the exportation of the seeds, which form an important article of Dutch commerce. But it is in stock (cattle, horses, sheep, swine, goats), and dairy produce in particular, that the rural industry of the Netherlands shows its strength.

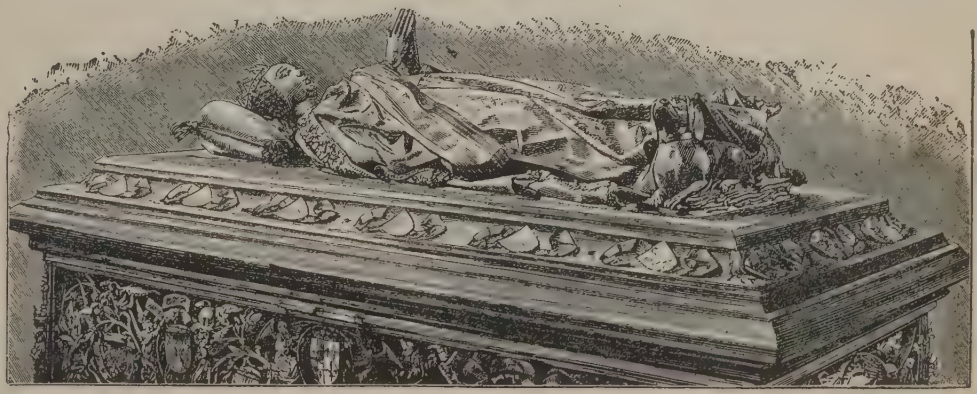
Commerce, Manufactures, etc.—The commerce of the country was at one time the most important in the world, and is even yet of great importance and activity. The external commerce is chiefly carried on with Great Britain, Germany, Belgium, and the Dutch colonies in the East. The total imports in recent years have varied from about $450,000,000 to $460,000,000, the exports from $350,000,000 to $415,000,000. A considerable portion of the trade is transit. The foreign trade centers chiefly

1. Sculptures from the Portal of the Servatius Church at Maastricht.



2. Marble-relief of Venus in the former Court-house at Amsterdam.

3. Monument of William of Orange in the new church at Delft. (H. de Keyser).



Monument of Mary of Burgundy, in the Church of Our Lady at Bruges (Peter de Beckere).

5. H. Leys (19th Century). Company in the House of a Dutch Citizen (Museum at Leipzig).

in Amsterdam and Rotterdam. The industrial occupations are varied. Shipbuilding and subsidiary trades are among the chief. Of textile manufactures that of linen is the most important; but silks and velvets, as well as woolens and cottons, are produced in considerable quantity. Pigments, brandy, gin, paper, glass, earthenware, etc., are among the more important products. Large numbers of the sea-board population are employed in the deep-sea fisheries. Railways have a length of 1,600 mi. The chief money unit is the florin or guilder=40 cents.

People, Institutions, etc.—The stock to which the people belong is the Teutonic; the great majority of inhabitants being descendants of the old Batavians. They comprise over 70 per cent. of the population, and are chiefly settled in the provinces of North and South Holland, Zeeland, Utrecht, and Gelderland. The Flemings of North Brabant and Limburg, and the Frisians, inhabiting Friesland, Groningen, Drenthe, and Overijssel, form the other groups. The government is a constitutional monarchy, the executive being vested in the king, and the legislative authority in the States-general, sitting in two chambers. The upper chamber, fifty in number, is elected by the provincial councils or assemblies of the eleven provinces; the lower chamber, 100 in number, is elected directly, the electors being all males of twenty-three years of age taxed at a certain figure. The members of the lower house are paid. The annual expenditure usually amounts to about $50,000,000, and in recent years has generally exceeded the revenue. The public debt amounts to about $460,000,000. The navy consists of 120 men-of-war, 24 of them ironclads; and the army of 2,338 officers and 62,734 men, with a militia numbering about 117,000. Elementary schools are everywhere established, and are partly supported by the state, but education is not compulsory. Higher class schools are in all the chief towns; while there are state universities, namely, at Leyden, Utrecht, and Groningen, and the municipal university at Amsterdam. The commercial capital of the country is Amsterdam, but the seat of government and residence of the sovereign is The Hague.

Language and Literature.—The literary language of the kingdom of the Netherlands is in English called *Dutch*, but by the people themselves is called *Hollandsch* or *Nederduitsch*, that is, Low Dutch. This name it receives in opposition to the *Hochdeutsch* or High Dutch, the literary language of modern Germany. Closely allied to the Dutch is the Flemish language. Both languages belong to the Low German group of the Teutonic or Germanic branch of the Indo-European family of languages. The two languages, or rather dialects, are in fact in their early history identical. What may be strictly called Dutch literature, as distinguished from Flemish, dates from the latter quarter of the sixteenth century. The chief names of this period are those of Coornhert, Von Marnix, Spiegel, and Visscher, who did much to polish and regulate the language, and to produce correct models both of prose and verse. Pieter Corneliszoon Hooft (1581–1647) brought the prose style to a high degree of excellence; and Joost van den Vondel (1587–1679), the greatest of Dutch dramatists, performed the same service for the language of poetry. Jacob Cats, familiarly known in Holland as "Father Cats" (1577–1660), on the other hand, confined himself to the sphere of every-day life. Among other leading names in pure literature are those of Constantyn Huygens (1596–1686), a satirist, epigrammatist, and didactic poet; Jacob van Westerbaan (d. 1670) and Jan van Hemskerk (d. 1656), both erotic poets; and Dirk Kamphuisen (d. 1626), a celebrated hymn writer. Among dramatists were Brandt (d. 1685), who was also an historian and epigrammatist; Oudaan (d. 1692), a political writer and lyrist; and Antonides van der Goes (d. 1684), celebrated also as a lyrist. The principal writer of comedies was Bredero (1585–1618). Dutch poetry declined toward the end of the seventeenth century partly through French influence, but a revival set in with Jacob Bellamy (1757–86). Willem Bilderdijk (1756–1831) shone in all departments of poetry. J. F. Helmers (1767–1813) won great applause by the descriptive poem *De Hollandsche Natie.* Hendrik Tollens (1780–1856) was as a lyrist the avowed favorite of his country, and his *Overwintering der Hollanders op Nova-Zembla* is regarded as the best descriptive poem in the Dutch language. An important service was rendered to the literature of his country by Jacob van Lennep (1802–68), who, incited by the example of Scott and Byron, introduced romanticism, and successfully repressed French classicism by his masterly treatment of native tales and historical subjects in narrative poems. The novelists who rank next to Van Lennep are Oltmans, Mrs. Bosboom-Toussaint, and Douwes Dekker (Multatuli). The list of recent Dutch prose writers also includes Schimmel, N. Beets, W. A. van Rees, Weitzel, Lange, J. ten Brink, Opzoomer, Limburg-Brouwer, and the historians Fruin (called the Dutch Motley) and Hofdijk. Dutch names famous in classical learning include those of Erasmus, Lipsius, Grotius, Gronovius, etc.; in science, Huygens, Leeuwenhoek, etc.; in philosophy, Spinoza; and in medicine, Boerhaave.

History.—The southern portion of the Low Countries belonged at the beginning of the Christian era to Belgic Gaul. The northern portion, inhabited by the Batavians and Frisians, formed part of Germany. The southern portion as far as the Rhine was held by Rome up to A.D. 490, after which it came under the rule of the Franks, as did also subsequently the rest of the country. In the eleventh century the territory comprised in the present kingdoms of Belgium and the Netherlands formed a number of counties, marquisates, and duchies corresponding more or less with the modern provinces. By the latter part of the fifteenth century all these had been acquired by the duke of Burgundy, and passed to the house of Hapsburg on the marriage of the daughter of Charles the Bold of Burgundy

to the son of the Emperor Frederick III. On the abdication of Charles V in 1556 they passed to his son Philip II of Spain. In consequence of religious persecution in 1576 Holland and Zeeland openly rebelled, and in 1579 the five northern provinces — Holland, Zeeland, Utrecht, Guelders, and Friesland — concluded the celebrated Union of Utrecht by which they declared themselves independent of Spain. They were joined in 1580 by Overijssel, and in 1594 by Groningen. After the assassination of William of Orange, July 10, 1584, Maurice became stadtholder (governor). His victories at Nieuport and in Brabant, the bold and victorious exploits of the Dutch admirals against the navy of Philip II, the wars of France and England against Spain, and the apathy of Philip II, caused in 1609 the Peace of Antwerp. But Holland had yet to go through the Thirty Years' War before its independence, now recognized by all the powers except Spain, was fully secured by the Peace of Westphalia. In the middle of the seventeenth century the United Netherlands were the first commercial state and the first maritime power in the world, and for a long time maintained the dominion of the sea. The southern provinces alternated between the rule of Spain and Austria till 1797, when they came under the power of the French Republic. In 1806 Louis Napoleon became king of Holland, but in 1810 it was incorporated with the French empire. In 1814 all the provinces both of Holland and Belgium were united by the Treaty of Paris to form the kingdom of the Netherlands. This arrangement lasted till 1830, when the southern provinces broke away and formed the kingdom of Belgium. King William I attempted to reduce the revolted provinces by force, but the great powers intervened, and finally matters were adjusted between the two countries in 1839. The king abdicated in 1840, and was succeeded by his son William II (1840–49), he being again succeeded by his son William III. who was succeeded in 1890 by his daughter Wilhelmina, under the regency of her mother. She was crowned Sept., 1898, at the age of 18. In May, 1899, the peace conference was held at The Hague. On Feb. 7, 1901, Queen Wilhelmina and Duke Henry of Mecklenburg-Schwerin were married at The Hague.

Nettle, a genus of plants belonging to the natural order Urticaceæ, and consisting chiefly of neglected weeds, having opposite or alternate leaves, and inconspicuous flowers, which are disposed in axillary racemes. The species are mostly herbaceous, and are usually covered with extremely fine, sharp, tubular hairs, placed upon minute vesicles filled with an acrid and caustic fluid, which by pressure is injected into the wounds caused by the sharp pointed hairs. Hence arises the well-known stinging sensation when these plants are incautiously handled. Nettles yield a tough fiber which may be used as a substitute for hemp. In Dresden a thread is produced from nettles so fine that sixty miles weigh only 2½ lbs. One kind of nettle is used in China to make the China grasscloth and various other species that are used for textile purposes. Nettle porridge and nettle broth are dishes made from young and tender nettles cut in March or April. The nettle is common in the U. S.

Nettle Rash (or Urticaria) (Latin, *urtica*, a nettle), a common disease of the skin, an eruption closely resembling nettle stings both as to appearance and as to the sensations it originates. It consists of small wheels, either red or white, sometimes both, having the centers white and the margins red. The disease may be either acute or chronic. When it is acute generally more or less of fever accompanies it. In almost all cases it arises from a disordered condition of the digestive organs, produced either by indigestible food, or in some persons by particular kinds of food which others eat with complete impunity.

Nettle Tree, natural order Urticaceæ, a deciduous tree, with simple and generally serrated leaves, much resembling those of the common nettle, but not stinging. It has a sweet fleshy drupaceous fruit. The common or European nettle tree grows to the height of 30 or 40 ft., and is frequently planted for ornament in the south of France and north of Italy. The wood is useful for various purposes. *C. occidentālis*, sometimes called the sugar berry, is a much larger tree, often attaining a height of from 60 to 80 ft. It is a native of North America from Canada to Carolina. A variety, *C. crassifolia*, is often called hack berry.

Neufchâtel (neu-shä-tel) (Neuchâtel) (in German *Neuenburg*), a Swiss canton, bounded by France, Vaud, the Lake of Neuchâtel, and Bern, with an area of 312 sq. mi. Grazing and dairy farming are extensively carried on in the canton; wine, fruits, hemp, and flax are produced. The chief manufactures are lace, cotton, watches, and clocks (especially at Chaux de Fonds and Locle). The religion is Protestant. The language is French, but German is also spoken. Pop. 107,977. The capital, which has the same name, lies 24 mi. w. of Bern. It has various manufactures and an extensive trade. Pop. 17,120.

Neuilly (*neu*-yē), a town of France, practically a suburb of Paris, on the right bank of the Seine, here crossed by Perronet's magnificent bridge. Pop. 25,235.

Neuralgia, the name given to that species of morbid pains which occur only in the course of one or more distinct nerves, and by this locality are distinguished from other pains. In neuralgia of the fifth nerve the pain is in one half of the face, and if the central branch is affected the pain is confined to the upper jaw; neuralgia of the chief nerve of the thigh (*sciatic nerve*) extends along the buttocks and back of the thigh down to the knee, and is called *sciatica*. It also affects the front, back, and outside of the leg, and the whole foot except its inner border; while neuralgia of the intercostal nerves manifests itself in a belt or circle of pain around the breast. The most common and best ascertained of the neuralgias are those of the nerves of the skin (*dermalgia*);

but nerve pains occur also in other parts, as in the joints, muscles, and in the bowels (*enteralgia*). Many of the internal parts may be the seat of similar local affections. The primary causes of the injury to the nerve producing neuralgia may be very various. It may be inflammation of the nerve itself, a swelling in or upon it, irritation of it produced by an ulcer or suppuration or swelling of the adjacent parts, especially the cavities of the bones, etc. Thin-blooded persons and those of weak nerves are most liable to be affected by neuralgia, which varies much in degree and duration. It is often chronic, and often suddenly occurs during the progress of other acute diseases, as in typhus, or intermitting fevers.

Neurapoph'yses (or Neural Arches), the name applied to the upper or superior arches which spring from the body of the typical vertebra, or segment of the vertebrate spine, and which by their union form a canal — the "neural canal" — inclosing the spinal marrow.

Neurin (Neurine), the nitrogenized substance of nerve fiber and cells, consisting chiefly of albumen and a peculiar fatty matter, associated with phosphorus.

Neuri'tis, inflammation of a nerve. Tenderness in the course of the nerve and pain recurring in paroxysms are among the symptoms. Paralysis may occur as a result, and in the case of a special nerve of sense loss of the particular sense. Neuritis of the optic nerve for instance, is a frequent cause of blindness.

Neurop'tera, an order of insects which undergo an incomplete metamorphosis, distinguished by the possession of four well-developed membranous wings, which are generally of equal, or nearly equal size. The name Neuroptera ("nerve-winged") is applied to the group in allusion to the large size of the nervures, or supporting "ribs" of the wings, which are very conspicuous, and give to the wings a reticuled or network-like appearance. The mouth is generally masticatory, the head large, and distinctly separable from the thorax, the antennæ generally slender. The tarsi possess from two to five joints. No sting exists. In some Neuroptera the metamorphosis may approach very nearly to the holometabolic or "complete" variety. In general the larvæ are aquatic, the pupa in the majority of cases closely resembling the perfect insect. The chief families included in the order comprise the Libellulidæ or dragon flies; the caddis flies; the may fly family; the Myrmeleontidæ, or "ant lions;" the Hemerobiidæ, or "lace-winged flies;" Termitidæ, represented by the celebrated "white ants" or termites of tropical regions.

Neuro'sis (Gr. *neuron*, a nerve), a name common to diseases of the nervous system unaccompanied by any discoverable alteration in structure, that is to say, *functional* diseases of the nervous system. Hysteria, for example, is a neurosis; catalepsy, some forms of mental disease, such as melancholia, various forms of neuralgia and spasm, are called neuroses.

Neurot'ic, a term introduced into medicine to indicate some relationship to the nervous system. Thus a neurotic disease is a nervous disease. So medicines that affect the nervous system, as opium, strychnine, etc., are called *neurotics*.

Neusatz (noi'zâts), a town of Hungary, on the Danube, opposite Peterwardein, with which it communicates by a bridge of boats. Pop. 21,325.

Neuss (nois), a town in Rhenish Prussia, 21 mi. n.w. of Cologne, on the Erft, near its junction with the Rhine. The church of St. Quirinus (1209) is a fine Romanesque building. Neuss has various flourishing industries, including woolen and cotton machinery and metal goods, and an active trade, especially in grain. Pop. 20,074.

Neustadt (noi'ståt) (new town), the name of numerous places in Germany.

Neu'stria, in the geography of the Middle Ages, the western kingdom of the Franks, in the north of France, so called in opposition to *Austrasia* (Austria, Oestreich), the eastern kingdom of the same. The term is derived from the negative particle *ne* (not) and *Austria*. On the death of Clovis (511) his sons divided his territories into two parts, which received these names. Neustria lay between the Meuse, the Loire, and the ocean.

Neuter, in zoology, a term applied to indicate those insect forms—represented chiefly among the ants, bees, and wasps—in which the characteristics of sex are either present in a rudimentary condition or may not be developed at all. Thus among the ants the community consists of males, females, and neuters, or "workers" as they are also termed. These ant-neuters are simply (sexually) undeveloped females, and upon these forms the performance of all the laborious duties of the ant colony devolves. In the bees the neuters, or workers, are similarly sterile females. The differences between the fertile females and neuters—both of which are developed from fertilized ova—appear to be produced through differences in the food upon which the respective larvæ are fed, and through similar and surrounding circumstances which affect the nutritive development of the larvæ. Plenty of food is thus said to produce females, and a scantier or different diet males or neuters.

Neutral'ity (Latin, *neuter*, neither) means, in the law of nations, that state of a nation in which it does not take part directly or indirectly, in war between other nations. To maintain itself in this state a nation is often obliged to assume a threatening position, to be able to repel, in case of necessity, every aggression on the part of either of the belligerents. Such neutrality is termed an *armed neutrality*. In maritime wars the treatment of effects of the enemy on board neutral vessels; or neutral effects on board hostile vessels, gives rise to very important questions. In former times the principle was pretty generally admitted, that the ownership of goods on board of the vessels was the only point to be considered, and not the property of the vessels themselves. The belligerents, therefore, seized merchar

dise belonging to the enemy on board of neutral vessels; but they restored neutral property seized under the enemy's flag. But the endless investigations which this system caused, since a consequence of it was the searching of neutral vessels, produced by degrees a new and totally contrary principle,—that the flag protects the cargo. The plenipotentiaries of Great Britain, Austria, France, Prussia, Russia, Sardinia, and Turkey assembled at Paris in April, 1856, agreed that the neutral flag should cover an enemy's goods, with the exception of contraband of war; and that neutral goods, with the exception of contraband of war, are not liable to capture under the enemy's flag. In the arbitration (in 1872) at Geneva of the *Alabama* claims of the U. S. against Great Britain, three rules were agreed to by the parties, to the effect that a neutral government is bound to use due diligence to prevent the fitting out in, or departure from, any of its ports of a vessel which it has reasonable ground to believe is intended to carry on war with a power with which it is at peace; that it is bound not to permit a belligerent to make use of its ports as a basis of naval operations, or a source of recruitment of men or military supplies; that it is bound to exercise due diligence in its own ports or waters, and as to all persons within its jurisdiction, to prevent any violation of these duties and obligations.

Neutralization, in chemistry, the process by which an acid and an alkali are so combined as to disguise each other's properties or render them inert, as may be done with sulphuric acid and soda.

Neutral Tint, a pigment used in water colors, of a dull grayish hue partaking of the character of none of the bright colors. It is prepared by mixing together blue, red, and yellow in various proportions.

Neva, a river of Russia, which issues from Lake Ladoga, course 40 mi. It is generally frozen over from October to April. Its commercial importance is enhanced by canals, which connect it with remote parts of the empire.

Nevada, the *Sagebrush State*, one of the Pacific states of the Union, is bounded on the n. by Oregon and Idaho, on the e. by Utah and Arizona, and on the s. and w. by California. Its greatest length from n. to s. is a little less than 500 m., and its greatest width from e. to w. is more than 400 m. It has an area of 110,700 sq. m. Nearly the whole of the state is included in the Great Basin, once occupied by a great inland sea. The ancient shore lines are clearly visible in certain places. Nevada is a high plateau, with an average altitude of 4,000 ft., and mountains rising from 1,000 to 8,000 ft. above its level are separated by valleys from 5 to 20 m. in width. Some of these valleys are barren and desolate; others, through which the rivers flow, have areas of arable land. The Owykee river rises in the northern part of the state, empties into the Snake and thence passes through the Columbia river to the Pacific ocaan. The Colorado river on the southern boundary flows into the Gulf of California. Other important rivers are Humboldt, which empties into Humboldt Lake; Truckee, which falls into Pyramid and Winnemucca lakes; Walker river, which discharges into Walker Lake; Carson river, which empties into Carson Lake; Reese river, which disappears in the sand; Quinn river, in the northern part of the state, and the Amargosa, in the southern part of the state.

Climate.—The climate is arid and nearly rainless. The air currents from the Pacific are thoroughly drained of their moisture before reaching the borders of the Great Basin, and pass over it as dry winds. In the southern part of the state, where the elevation above sea is least and the temperature highest, the rainfall averages not more than five inches per annum, while the evaporation is extremely rapid. In the northern part the rainfall is greater, averaging not far from fifteen inches in many localities. Nowhere, however, is it sufficient for the needs of agriculture, and consequently irrigation has to be universally resorted to. The mean annual temperature in the habitable portions of the state ranges from 70° in the south to 45° in the north. The mean temperature at Winnemucca is 50°.

Agriculture.—The state is not agricultural, but by aid of irrigation can supply the needs of the population. The mountain-slopes and some of the valleys bid fair to be among the best grazing lands of the Pacific region. The flora is scanty and is characterized by artemisia. The staple productions are wheat, potatoes and hay. In 1900, the live stock was valued at $8,642,108.

Mining.—The leading industry of Nevada is mining. From 1871 to 1879, the state held the first rank in the production of the precious metals. Of recent years there has been a decrease in the output, especially since 1897. Two mines on the Comstock, the California and Consolidated Virginia, known as bonanza mines, have yielded the greater part of the silver and gold, the bullion of the Comstock being about one-third gold and two-thirds silver. The rich deposits of the vein, known as "bonanzas," have been exhausted as far as discovered. Explorations, however, are actively continued. In the Yellow Jacket and Belcher mines the workings have received a depth of 3,000 ft., and in the Ophir and Mexican mines they are prospecting at a point 3,100 ft. below the surface, the greatest depth to which mining operations have been carried anywhere in America. At these great depths the lode is found to diminish neither in width nor strength of formation. The heat of the rock is intense in these levels, and it is possible for men to work only for very short periods. Silver is the staple product. Other minerals are lead, copper, manganese, iron in numerous forms, sulphur, gypsum, precious stones, mica and soda.

Manufactures.—The manufacturing interests of Nevada are confined mainly to the smelting and reduction of ores. The value of manufactures in the state in 1900 was $1,643,675.

Transportation.—There are several railroads in the state, with a total mileage of about 1,000. The Central Pacific is the principal trunk line.

Education.—Nevada has a system of common schools, a state normal school and a state university located at Reno, with departments for agriculture, mechanical arts and mining, as well as the usual academic department.

History.—Nevada is a part of the territory ceded to the United States by Mexico, by the treaty of Guadalupe Hidalgo, Feb. 2, 1848. It was constituted a territory in 1861 with somewhat smaller boundaries than at present. It was admitted into the Union as a state in 1864. Additions were made to its territory in 1866. Although the Mormons had established a camp in Nevada in 1848, its real history begins with the discovery of silver there in 1859. Owing to the decline of gold and silver mining during the last ten years, the manufacturing interests as well as the population of the state have decreased. The population in 1900 was 42,335, of which 5,210 were Indians and 1,352 Chinese. The principal cities, with their population in 1900, are: Carson City, the capital, 2,100; Reno, 4,500; Virginia City, 2,695; and Winnemucca, 1,110.

Nevada, Vernon co., Mo., 90 mi. s.w. of Sedalia. Railroads: Missouri Pacific, and M. K. & T. It is in the center of a coal mining, agricultural, and stock-raising district. Industries: galvanized iron, and carriage works, flour and lumber mills, etc. Seat of a State Lunatic Asylum. Pop. 1900, 7,461.

Nevers (ne-vār), France, on the right bank of the Loire, at the confluence of the Nièvre, 153 mi. s.s.e. Paris. Nevers has important industrial establishments, including potteries and porcelain works, producing ware which has long been famed. The navy-cannon foundry, the largest ordnance foundry in France, was in 1880 turned into a practical school for boiler making and engine fitting. Pop. 20,935.

Neville's Cross, a cross near Durham, erected by Ralph Neville to commemorate the battle fought here between the Scottish and English forces, Oct. 17, 1346. The Scotch were totally defeated, and their king, David Bruce, was taken prisoner. The cross was destroyed in 1589.

New Albany, co. seat Floyd co., Ind., on the Ohio river, 5 m. below Louisville. Railroads: Ohio & Mississippi; L. N. A. & C.; B. & O., Southwest; P. C. C. & St. L., and L. E. & St. L. Industries: Plate glass works, rolling mills, pork-packing establishments, edge tool factories, engine and boiler works, flour and planing mills. It is the seat of DePauw Female College, and the center of a large shipping trade. Pop. 1900, 20,628.

Newark, Licking co., O., on Licking River, 33 mi. e. by n. of Columbus. Railroads: P. C. C. & St. L., and B. & O. Industries: railroad machine and repair shops, stove, glass, iron, and engine works, boiler shops, and bent wood works. It is the center of a grain and wool-raising district. Pop. 1900, 18,157.

Newark, Essex co., N. J., on Passaic River, 8 mi. w. of N. Y. Railroads: Penna.; Central of N. J.; D. L. & E.; and Lehigh Valley. Industries: thread mills, steel foundry, and a large number of factories. Surrounding country agricultural and mineral. The town was first settled in 1666 and became a city in 1836. Pop. 1900, 246,070.

New Bedford, Bristol co., Mass., on Acushnet River, 56 mi. s.e. of Boston. Railroads: N. Y., N. H. & H.; and Old Colony System. Industries: 35 cotton mills, woolen mill, three iron foundries, and about 700 other shops and factories. Surrounding country agricultural. The town was first settled in 1652 and for years was the chief whaling port of the world; became a city in 1847 and is distinctively a manufacturing city; stands first in the manufacture of cotton goods. Pop. 1900, 62,442.

New Berne, Craven co., N. C., at conjunction of Trent and Neuse rivers. Railroad, Atlantic & N. C. It has an export trade in garden products, grain, lumber, and naval stores. Manufactures include gum wood plates and dishes, lumber, plows, turpentine, cottonseed oil, cotton goods, carriages, etc. Has important fisheries. Pop. 1900, 9,090.

New Brighton, Beaver co., Pa., on Beaver River, 29 mi. n.w. of Pittsburg. Railroads: Pennsylvania, and P. & L. E. Industries: porcelain co., machine works, six potteries, twine mill, two flouring mills, planing mill, steam driller works, glass, wire, iron novelties, and many other factories. Coal, oil, and natural gas in vicinity. Surrounding country agricultural and mineral. The town was first settled in 1800 and became a borough in 1850. Pop. 1900, 6,820.

New Brighton, Richmond co., N. Y., on Staten Island coast, 6 mi. s.w. of New York. Railroad, Staten Island. Granite is found in the vicinity. Has paper mills, silk dyeing and printing works. It contains the Sailors' Snug Harbor for aged and disabled seamen. Now a part of Greater New York.

New Britain, Hartford co., Conn., 10 mi. s.w. of Hartford. Railroad, Junction N. Y. & N. E. with New Britain branch of N. Y., N. H. & H. Manufactures include builders' tools, cabinets, pianos, harness, hardware, cutlery, joiners' tools, knit goods, locks, jewelry, etc. Seat of the State Normal School. Pop. 1900, 25,998.

New Brunswick, a province of the Dominion of Canada, on the east coast of North America; area 27,322 sq. mi. Coal is plentiful, and iron ore abundant; the former is said to extend over 10,000 sq. mi., or above one third of the whole area. Copper, manganese, gypsum, limestone, and freestone abound. After agriculture, lumbering and fishing are the main occupations of the inhabitants, though many are engaged in mining and manufacturing. A very large portion of the soil is well adapted for agriculture, but only about one tenth of the land suitable for agriculture has as yet been taken up. Great attention has of late years been paid to the improvement of live stock. New Brunswick is one of the most

amply wooded countries in the world, and the forests suppiy three fourths of the total exports. The fisheries are very valuable. The minerals exported include coal, gypsum, antimony ore, copper ore, manganese, plumbago, and unwrought stone. Owing to its cheap coal and proximity to the markets of the world, New Brunswick is expected to develop as a manufacturing country, especially now that the railway system has been completed throughout the interior of the province. The affairs of the province are administered by a lieutenant governor, aided by an executive council consisting of nine members, a legislative council of eighteen members appointed for life, and a house of assembly of forty-one representatives of the people. The province has ten seats in the Dominion Senate and sixteen in the House of Commons. Religion is abundantly provided for, as is education, both high and elementary. The latter is free but not compulsory. The province is divided into fifteen counties. Discovered by Sebastian Cabot (1498), it formed, with Nova Scotia, the French colony of Acadia (1604–1713), was erected into a separate province in 1784, and in 1867 became a province of the Dominion of Canada. The capital is Fredericton, but the chief commercial center is St. John, which has one of the finest harbors on the North Atlantic. Pop. 321,294.

New Brunswick, Middlesex co., N. J., 31 mi. s.w. of New York. Head of navigation on the Raritan River. Railroad, Pennsylvania. Industries: largest india rubber works in America, employing 2,000 men; other manufactures are sashes, shoes, screws, hosiery, carpets, etc. It is the seat of Rutger's College, and the Dutch Reformed Theological Seminary. Pop. 1900, 20,006.

Newburg, Orange co., N. Y., on Hudson River, 60 mi. n. of New York. Railroads: Newburg branch of Erie; Newburg & N. Y.; West Shore; Dutchess & Connecticut; New York Central. Industries: steam mills, flouring, mill four iron foundries, woolen mill, cotton mill, two farm implement factories, and about fifty other important ones. Surrounding country agricultural, dairying, and fruit raising. The town was first settled in 1709, and became a city 1800. Pop. 1900, 24,943.

Newburyport, Essex co., Mass., on Merrimac River. Railroads, Boston & Maine, eastern and western divisions. Industries: five shoe factories, iron foundry, silver ware, and wool hat factories. Surrounding country agricultural. The town was first settled in 1635 and became a city in 1851. Pop. 1900, 14,478.

New Caledonia, an island in the Pacific, situated about 800 mi. e. of Australia. It was discovered by Captain Cook in 1774, and appropriated by the French as a convict settlement in 1854. Their capital is Noumea, near the south end of the island, with a fine harbor. There are nickel mines, and also mines of copper and cobalt, considerable quantities of which are raised and exported, as also chrome, copra, coffee, etc. Pop. 60,703. The attempt of the French to work the settlement both as a free and as a penal colony has not hitherto answered well; and the frequent escape of convicts to Australia has been a source of trouble and international dispute.

New Castle, co. seat Lawrence co., Pa., on Shenango river, 50 m. n.w. of Pittsburg. Railroads: Pennsylvania lines; P. & L. E.; P. & W.; W. N. Y. & P.; B. & O.; E. & P.; N. C. & B. V., and N. Y. P. & O. Industries: tin plate mill, flouring mills, iron foundries, wire nail mills, rod mill, steel co., tube mill, engineering works, blast furnaces, street car works, glass, brick and numerous other factories. It is in a bituminous coal, limestone, fireclay, iron-ore and sandstone region. The town was first settled in 1798 and became a city in 1869. Pop. 1900, 28,339.

Newcastle-under-Lyme, a borough of England, Staffordshire, close to the potteries, and 19 mi. n.n.w. of the town of Stafford. Coal and iron works are carried on in the neighborhood, giving employment to a large number of the inhabitants, most of whom, however, ind work in the potteries. Pop. 18,452.

Newcastle-upon-Tyne, river port and city, in the county of Northumberland, England, but forming a county in itself. Newcastle, owing to the rich mineral products of the neighborhood, has attained a first position among the great centers of British enterprise. Some of the more important of its industries are shipbuilding, and the manufacture of locomotive and marine engines, cannon, shot, tools, firebricks, hemp and wire ropes, cables, anchors, sails. Situated in the midst of one of the largest coal fields in England, it exports immense quantities of coal. Pop. 186,345.

Newcomen, Thomas, a locksmith at Dartmouth, in Devonshire, toward the close of the seventeenth century, and one of the inventors of the steam engine. Newcomen conceived the idea of producing a vacuum below the piston of a steam engine after it had been raised by the expansive force of the steam, which he effected by the injection of cold water to condense the vapor. The merit of first applying the steam engine to practical purposes is thus due to Newcomen, who, in conjunction with Captain Savery and John Cowley, took out a patent for the invention in 1705.

Newel, the central space or column round which the steps of a circular staircase are wound. When there is no central pillar the newel is said to be open.

New England, the northeast portion of the U. S., comprising the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. Originally called North Virginia when granted by James I to the Plymouth Company in 1606, it received the name New England from Captain John Smith, who explored and made a map of the coast in 1614.

New Forest, a large tract in England, in the southwest of Hampshire, forming one of the royal forests, about 60 mi. in circuit, which is commonly said to have been laid

waste and turned into a forest by William the Conqueror. It contains within its limits portions of cultivated land belonging to private persons. The public portions are partly enclosed, partly unenclosed, and present much fine sylvan scenery. There are several villages within the forest area, Lyndhurst being the forest capital. Oak and beech are the principal trees.

Newfoundland, a large island of British North America, in the Atlantic Ocean, at the mouth of the Gulf of St. Lawrence. Area, excluding the territory of Labrador on the mainland, which belongs to this colony, 40,000 sq. mi. (or nearly 10,000 more than Ireland). The largest rivers are Humber River and the river Exploits; the largest lakes Grand Pond and Indian Lake. The minerals comprise coal, gypsum, copper, lead, nickel, silver, iron, and gold. Copper exists in large quantities, and is worked to a greater extent every year. The wild animals are the caribou or reindeer, bear, wolf, hare, beaver, marten, wild cat, etc. The famous banks of Newfoundland around the coasts swarm with almost every variety of fish, particularly cod. The cod fishery is prosecuted from June to November, and may be said, with the other fisheries, of seal, lobster, herring, and salmon, to form the staple occupation of the inhabitants. Codfish is far the largest export. The trade is chiefly with Britain, Canada, and the U. S. The currency is dollars reckoned at 4s. The affairs of the colony are administered by a governor, appointed by the crown; an executive council composed of the governor and six responsible ministers; a legislative council of fifteen members, nominated by the governor; and a house of assembly of thirty-six members, elected by manhood suffrage (according to act of 1889). Religion is chiefly divided between the Roman Catholic, Anglican, and Wesleyan bodies. Education is denominational. The original Atlantic cable lands in Heart's Content Harbor. Newfoundland was discovered by John Cabot in 1497, and the first English colony was planted in 1621. A struggle for supremacy took place between the English and the French; but in 1713 Newfoundland and its dependencies were declared by the Treaty of Utrecht, to belong wholly to Great Britain, the French reserving a right to fish and cure on certain parts of the coast. Responsible government was granted in 1833. The colony, as yet, declines to join the Canadian Confederation. The only noteworthy town on the island is St. John's, the capital. Pop. 193,124.

Newfoundland, a breed of dogs originally introduced into England from the island of Newfoundland, where they were used for draught purposes. As the mastiff at that time was scarce, and the St. Bernard had not yet appeared in England, the Newfoundland became exceedingly common, but has been eclipsed in popularity of late years by the other two breeds mentioned. In general appearance the Newfoundland is a large and imposing dog, mild in expression, but showing great strength. The head should be large, with ears falling close; neck long if possible; loins strong and well ribbed up, a point seldom seen in this breed; tail long and powerful, as it is used greatly when swimming; coat, long and wiry; color, black without any white markings. Much discussion was caused by Sir E. Landseer's well-known picture of a black and white dog entitled, *A Distinguished Member of the Humane Society* (1838). An attempt was made to prove that the black and white dog was the true Newfoundland; but it is now generally regarded as a cross from the black. The black and white variety, now known as the Landseer Newfoundland, has been kept pure for many generations; it is now almost as pure, and certainly as handsome, as the original variety. The Newfoundland is a splendid water dog, and takes to the sea at an early age. He is also a natural retriever, and, though himself too heavy for field work, has been extensively used to found the ordinary re-

Newfoundland Dog.

triever. From his formidable appearance, combined with docility and intelligence, he makes a capital watch-dog, for which purpose he is extensively used.

New Guinea (or Papua), a large island in Australasia, next to Australia the largest on the globe; area 305,900 sq. mi. The discovery of New Guinea was made by the Portuguese early in the sixteenth century, but little was known of it till recently. The naturalists were the first to make incursions into its interior, and among these Mr. A. R. Wallace, who visited it in 1858, was the pioneer. The missionaries came next, and mission stations have been formed by Germans on the northeast coast, and by the London Missionary Society at various points on the southeast coast. Germany and the Australian colonies also began to take an interest in New Guinea, and the latter urged the home government to annex the eastern part of the island, the western portion having long been recognized as Dutch. At length the delimitation and division of the island between Great Britain, Germany, and Holland was settled in 1885. That part of the

island lying west of the 141st meridian is assigned to Holland; the northern part of the rest of the island is assigned to Germany, and the southern to Great Britain. The government of the British portion is in the hands of an administrator appointed by the crown, assisted by an executive and legislative council. The official center is Port Morseby. The islands of Torres Strait, which are the seat of a valuable pearl shell and trepang fishery, and which practically command the strait, have all been annexed to Queensland. A German chartered company whose object is to develop the resources of the country has stations in German New Guinea. The Dutch have done little or nothing for their portion of the island. Estimates of the total population vary between 500,000 and 2,500,000.

New Hampshire, the *Granite State*, one of the New England States and also one of the thirteen original states of the Union, bounded on the n. by the Province of Quebec, on the e. by Maine and the Atlantic ocean, on the s.e. and s. by Massachusetts and on the w. by Vermont and the Province of Quebec, from both of which it is separated by the Connecticut river. The greatest length is 178 m., and the greatest width 100 m ; the area is 9,336 sq. m.; the population in 1900 was 411,588, and in 1902 was estimated to exceed 415,000.

Surface —With few exceptions, the state is rugged and mountainous. The White Mountains occupy the south central part of the state, covering an area of about 1,400 sq. m., and constitute its most striking physical feature. They are a part of the Appalachian system, and are divided by the valleys of the Saco and the Ammonoosuc rivers and the famous "Notch" into two ranges, known respectively as the White and Franconia ranges. Mt. Washington (6,286 ft.) is the highest point near the Atlantic north of Mt. Mitchell, in North Carolina. There are twenty-eight other peaks over 4,000 ft. in altitude. These mountains abound in dense forests, deep gorges, clear streams and picturesque nooks and glens. In the Franconia range is found the "Old Man of the Mountain," a profile formed by projecting rocks and measuring more than eighty feet from forehead to chin. Because of its beauty the White Mountain region is often called the "Switzerland of America." Most of the region to the north is high and hilly, while the southern part of the state is lower and more even. The Connecticut and its tributaries drain the western and northern regions, and the Merrimac and Piscataqua the southern and southeastern. The banks of the Merrimac are lined with manufactories, and it is said to turn more spindles than any other river in the world. The Piscataqua remains open from Dover to its mouth the entire year and forms the only harbor in the state. Numerous small lakes, noted for their beauty, are scattered over the state. Lake Winipisiogee, the largest, is 19 m. long, 8.25 m. wide, and contains 264 islands.

Climate.—New Hampshire has a typical New England climate. The winters are severe, and in the northern half snow usually falls to a great depth. The summers are mild and pleasant. The mean annual temperature at Concord is 48°. The annual rainfall, including snow, is 45 in.

Mining.—Gold, silver, copper, lead, zinc and other ores are found, but in such small quantities and so difficult to work that they cannot be mined with profit. Granite, soapstone and mica are quarried in large quantities. New Hampshire produces nearly four-fifths of the output of mica in the United States. Slate, clay, porphyry and limestone are also found.

Agriculture.—In general, the soil is poor but along the Connecticut and in the valleys of other streams good farms are found. Much of the state is covered with forests, from which the most valuable timber has been cut. Where these forest areas have been cleared, especially in the northern portion of the state, the soil yields good crops. The farms are small and diversified farming is general. Dairy products, live stock, poultry, wool, oats, hay and potatoes are the chief agricultural products.

Manufactures.—Manufacturing is the leading industry. It is estimated that there are 2,000 water-powers in the state, and most of them are employed. The leading manufactories are in the southern part of the state, where abundant water-power, proximity to good markets and excellent shipping facilities are greatly to their advantage. In 1900, the state contained 5,267 establishments, giving an average employment to 70,786 wage-earners and producing an annual output valued at $119,025,902. The leading manufactures are boots and shoes, cotton goods, woolen goods, lumber and paper and wood pulp.

Transportation.—The Piscataqua forms an excellent harbor at Portsmouth, which is the only seaport. Numerous lines of railway traverse the valleys, and nearly every town of importance has ready access to one or more of these lines. With few exceptions, the railways are controlled by one of the following systems: Boston & Maine, Fitchburg, Maine Central and Grand Trunk. The Mount Washington railway makes an ascent of 3,625 feet in 2¾ miles, and is the first of its kind ever constructed. It is operated during the summer for the benefit of tourists.

Education.—The public school system is efficient and well sustained. There are also many private and denominational academies and seminaries. Dartmouth College, at Hanover, is the leading educational institution and one of the oldest colleges in the country. The State Agricultural College is at Durham, the State Normal School at Plymouth, and the School for Feeble-Minded Children at Laconia. The charitable, reformatory and penal institutions are the Orphans' Home, at Franklin; the Hospital for the Insane, at Concord; the Industrial School, at Manchester; and the state prison, at Concord.

History.—The earliest settlements in New Hampshire were made near Dover and Portsmouth in 1623. New Hampshire was a part of the Massachusetts colony from 1641 to 1679,

from 1689 to 1692, and from 1699 to 1741. During the intervening dates and until 1775, this territory was under colonial governors of its own. The people of New Hampshire took an active part in the Revolutionary War. In 1776, a provisional government was founded, and in 1784, a state constitution was adopted. New Hampshire was the ninth state to ratify the Federal Constitution, which it did on June 21, 1788. During the Civil War, New Hampshire earnestly supported the Union. The principal cities in the state with population in 1900, are Concord, the capital, 19,632; Manchester, 56,987; Nashua, 23,892; Dover, 13,207; Portsmouth, 10,637; Rochester, 8,466; Claremont, 6,498; and Franklin, 5,846.

New Haven, co. seat, New Haven co., Conn., 74 m. n.e. of New York. Railroads, Housatonic, and N. Y. N. H. & H. It is the chief port of entry, with a large foreign trade, and has many factories, with an invested capital of $12,000,000. Manufactured goods include firearms, rubber goods, carriages, clocks, jewelry, needles, musical instruments and iron and steel goods. Here are located the Marlin, the Whitney and the Winchester Arms companies. It is the seat of Yale College, including Peabody Museum and Yale School of Fine Arts, and of Hopkins Grammar School. Pop. 1900, 108,027.

New Hebrides, a long chain of volcanic islands in the Pacific, lying northwest of Fiji and northeast of New Caledonia, and embracing an area of about 3,000 sq. m.. They are extremely fertile, producing cocoanuts, sandal wood, fruits and all manner of Polynesian produce.

New Ireland, the name of the largest of a group of islands situated east of New Guinea, in the Bismarck Archipelago, in the Pacific Ocean. The inhabitants are cannibal Papuans; the islands are volcanic, and the soil good. Called by the Germans *Neu Mecklenburg.*

New Jersey, one of the original thirteen states of the Union, is bounded on the e. by the Hudson River, Staten Island Sound, Raritan Bay, and the Atlantic Ocean; on the s. by Delaware Bay; on the w. by Delaware River; and on the n. by New York. The extreme length is 168 mi., and the width ranges from 59 to 32 mi.; and the state has an area of 7,576 sq. mi. New Jersey lies entirely on the Atlantic slope of the U. S. In the north and northwest it is traversed by the Appalachian chain; the Red Sandstone belt, intersected by trap dikes, and extending from Massachusetts to South Carolina, occupies the central portion; and the lower half of the state is a part of the level, sandy tract, covered with pine woods, which borders the Atlantic from New York to Florida. The state is abundantly watered; its chief rivers, the Passaic, Raritan, Little and Great Egg harbor, flow southeast into bays. The coast from Sandy Hook to Cape May is generally protected by peninsula or island beaches.

Climate.—The climate varies greatly in different parts of the state, but is generally healthful. The greatest changes are along the sea coast, where ocean breezes, land winds, and depressing humidity alternate. The mean temperature at Atlantic City is 52°. The annual rainfall is about 49 in.

Vegetation.—The forest area comprises about one third of the state and contains pine, cedar, oak, hickory, chestnut, basswood, dogwood, ash, and elm. Wild grapes, apples, peaches, plums, cherries, and watermelons and muskmelons are very prolific. Cranberries are grown extensively. The farm products consist principally of corn, wheat, rye, oats, buckwheat, potatoes, and hay.

Mining.—The output of the non-precious minerals places New Jersey high in the list of states, it being ninth among the iron-producing states and second as to zinc ore. Other mineral products are limestone and slate.

Manufactures.—New Jersey ranks sixth in the Union in the importance of its manufactures. It is the leading state in the manufacture of silk goods, pottery and glass, while the output of machinery, leather and sugar, woolen goods and cotton fabrics is large. The conservative attitude of the legislature towards incorporated capital, the low rate of taxation, and the slight expense attending the act of incorporating have all combined to induce large corporations to locate within the state. There are seven trunk line railway systems in the state. The total value of the manufactures for 1900 was about $612,423,738.

Education.—The state normal school is at Trenton, and its preparatory school at Beverly; and the state agricultural and scientific school is connected with Rutger's College, at New Brunswick. Princeton University, founded in 1746 at Princeton, is the most famous institution in the state, and one of the best in the country. There are besides seven county asylums, two large lunatic asylums near Trenton and Morristown, the latter accounted a model; an institution for the deaf and dumb, an industrial school for girls, and a large state prison, at Trenton; a reform school for boys near Jamesburg; and a home for disabled soldiers at Newark.

History.— The first settlement in New Jersey was made by the Dutch at Bergen, near New York, in 1617. Cornelius May ascended the Delaware in 1623 and built a fort 4 mi. below the site of Camden. The Swedes, who had conquered and expelled the English colonists from that region in 1638, were in turn conquered by Peter Stuyvesant in 1655. In 1664 the territory was granted by Charles II to the Duke of York, and by him to Sir George Carteret and Lord John Berkeley. There was no trouble with the Indians, whose titles were peacefully purchased. The proprietors soon divided the territory into East and West Jersey. In 1674 Quakers settled Salem and Burlington; and in 1682 a society under Penn bought the Carteret rights in East Jersey. The two provinces were reunited in 1702; and from 1738 New Jersey had its own governors. It bore its part in the colonial wars, contributed 10,726 men to the Continental army, besides militia. New Jersey suffered heavily during the Revo-

INVENTORS

S. F. B. Morse
Gugleimo Marconi

Alexander Graham Bell
Robert Fulton

Plate 25, Vol. III

lution, and was the scene of several important campaigns and battles. The state took an active part in the War of 1812, and the Civil War. Principal cities: Trenton, the capital; Camden, Elizabeth, Hoboken, Jersey City, Newark, New Brunswick, Patterson, Orange. Popular name, *Jersey Blue State.* Pop. 1900, 1,883,669, of which 71,352 are colored.

Governors.—William Livingstone, 1776–90; William Patterson, 1790–94; Richard Howell, 1794–1801; Joseph Bloomfield, 1801–02; John Lambert, 1802–03; Joseph Bloomfield, 1803–12; Aaron Ogden, 1812–13; William S. Pennington, 1813–15; Mahlon Dickerson, 1815–17; Isaac H. Williamson, 1817–29; Peter D. Vroom, 1829–32; Samuel L. Southard, 1832–33; Elias P. Seeley, 1833; Peter D. Vroom, 1833–36; Philemon Dickerson, 1836–37; William Pennington, 1837–43; Daniel Haines, 1843–44; Charles C. Stratton, 1844; Daniel Haines, 1844–51; George E. Fort, 1851–54; Rodman M. Price, 1854–57; William A. Newall, 1857–60; Charles S. Olden, 1860–63; Joel Marker, 1863–66; Marcus L. Ward, 1866–69; Theodore F. Randolph, 1869–72; Joel Parker, 1872–75; Joseph D. Bedle, 1875–78; George B. McClellan, 1878–81; George C. Ludlow, 1881–84; Leon Abbett, 1884–87; Robert S. Green, 1887–90: Leon Abbett, 1890–93; George T. Werts, 1893–96; John W. Griggs, 1896–99; F. M. Voorhees, 1899–1902; Franklin Murphy, 1902–1904.

New Leon (Neuvo Leon) a state in the northeast portion of Mexico; area 53,637 sq. mi. It is mountainous but fertile. Lead, gold, silver and salt are mined. Chief town, Monterey. Pop. 270,852.

New London, New London co., Conn., 50 mi. e. of New Haven. Railroads: N. Y., N. H. & H., and others. There are also several steamer lines. It is a port of entry and the seat of seal and whale fisheries. Has hardware, machinery, and boiler works, cotton gins, mowing machines, woolen and sewing-silk factories. Pop. 1900, 17,548.

Newman, John Henry, Cardinal (1801–1890), Catholic divine; educated at Ealing and Trinity College, Oxford, where he graduated with classical honors (1820), and was elected fellow of Oriel College. He was vice principal of St. Alban's Hall (1825–26) under Dr. (afterward Archbishop) Whately, and was incumbent of St. Mary's, Oxford, and chaplain of Littlemore (1828–43). During this last period he took part with Keble and Pusey in originating the Oxford movement; was a leader in the propaganda of High Church doctrines, and contributed largely to the celebrated *Tracts for the Times.* The last of these, on the elasticity of the Thirty-nine Articles, was censured by the university authorities, and was followed by Newman's resignation of his livings (1843), and secession to the Church of Rome (1845). Ordained a priest of that church, he was successively head of the oratory of St. Philip Neri at Birmingham, rector of the Roman Catholic University of Dublin (1854–58), and principal of the Roman Catholic school at Edgbaston. In 1879 he was created a cardinal. He has written some remarkable works sustaining the doctrines of the Church of Rome, particularly the *Apologia pro Vitâ suâ* (1864), and the reply to Mr. Gladstone (1875) on the *Vatican Decrees.*

New Mexico, a territory in the southwestern part of the U. S.; bounded on the n. by Colorado, on the e. by Oklahoma and Texas, on the s. by Texas and Mexico and on the w. by Arizona. It has an area of 122,580 sq. m. The population in 1900 was 195,310, of which 13,144 were Indians.

Surface.—The surface belongs to the great plateau upon which rests the Rocky mountain system. From an altitude of 7,000 ft. in the north it descends gradually to 3,500 in the Llan. Estacado of the southeast. Except in the east the whole region is traversed by broken ranges of mountains having a north and south trend. Some peaks reach a height varying from 8,000 to 13,000 ft. New Mexico, while generally requiring irrigation for its cultivation, is more fully provided with rivers than any of the other mining states or territories. The Rio Grande passes completely through the center of the territory from north to south and receives many tributaries. The northeastern part of the territory is drained by the Red river and its numerous branches. The Pecos rises northeast of Santa Fe, and flowing south crosses the Texas line and finally joins the Rio Grande. In the northwest is the Rio San Juan. In the central west are the head waters of the Little Colorado, and in the southwest those of the Gila.

Climate.—The delightful and healthful air of this territory has given it repute as a health resort. The mean temperature at Santa Fe is 48°, the extremes being from one degree below to 70° above zero. The average rainfall is from 15 to 17 in.

Agriculture.—The greater portion of New Mexico is pasture land, and stock raising is, next to mining, the chief industry. Wherever there is sufficient water, either in streams or in springs to supply the wants of animals, the grass is amply sufficient to support either cattle or sheep. New Mexico produces more sheep than any other state or territory in the Union. The supply of timber, especially pine, is almost inexhaustible. It exists in nearly all the hilly and mountainous parts of the territory. Large crops of grain and most kinds of vegetables, especially onions, beets, turnips, cabbages and cauliflowers are largely produced. Potatoes succeed best in the mountainous regions. The Taos valley is an exceptionally fine wheat country. It is as a fruit-producing region, however, that a large portion of the irrigated land of the territory especially excels. The area of fruit and vine culture is being yearly extended. Peaches, plums and apricots come to great perfection in the n. and pears, apples, quinces, cherries, etc., as well as the stone fruits, throughout the middle and southern sections. Grapes flourish from Bernalillo to El Paso, and in some favored spots, like La Joya, farther n.

Mining.—Mining for the useful and precious metals has been extremely active throughout the territory during 1901 and 1902. Much at-

tention has also been given to oil lands. The product of the gold and silver, lead and copper mines for 1901 amounted to $6,000,000. The coal output was 1,217,530 tons, valued at the mines at $1,606,174. The coke production was valued at $117,516.25. Arrangements have been made during 1902 to develop large coal fields heretofore untouched. Iron ore is produced in large quantities. Near Santa Fe are the famous turquoise beds, the product of which in 1901, was valued at $100,000.

Manufactures.—The growth of manufacturing interests since 1897 has been almost phenomenal. The value of products in 1890 was $1,516,195; in 1900, it was $5,605,783, or almost four times as much. The value, including custom work and repairing, was $5,621,332. The important industries are the smelting of copper and lead ores, flour milling, railroad repair shops, carpentering, lumber and timber products, milling and smelting quartz and wool-scouring. There are also a beet sugar factory, several distilleries and fruit canneries.

Transportation.—A significant factor of New Mexico's growth is found in its increasing railway mileage. The mileage for 1901 was 2,180.5, including the lines under construction. The principal roads are, the Atchison, Topeka & Santa Fe, C. R. I. & P., Denver & Rio Grande, Pecos Valley & N. E.; Southern Pacific and El Paso & S. W.

Education.—The interest in public schools is constantly growing. In 1870, 85 per cent. of the population could not read or write; now this percentage has been reduced to about 20 per cent. One-fourth of all taxes is applied to the support of the public schools. Institutions of higher learning are the University of New Mexico at Albuquerque, an agricultural college at Las Cruces, the Christian Brothers' College at Santa Fe and a normal school at Silver City.

History.—Early Spanish adventurers penetrated this territory in 1537, and in 1581 named it New Mexico. The revolution which overthrew Spanish power in Mexico, 1822, also gave freedom to New Mexico, and it was governed with Mexico until 1846. A small United States force under Gen. Kearney captured Santa Fe, gained control of the whole territory and secured its cession to the United States in 1848. The "Kearney Code," enacted in 1865, was in force until 1876, when the "common law as recognized in the United States of America" was adopted. In 1897, a new code of civil procedure was enacted. During the early part of the Civil War, the territory was the scene of a protracted and bloody strife. The last four years have been the most prosperous in the history of the territory. The principal cities with their population in 1900 are: Santa Fe, the capital, 5,603; Albuquerque, 6 238; Las Vegas, 3,552; and Raton, 3,540.

New Orleans, capital of Orleans parish, Louisiana, chief city and port of entry of the state and commercial metropolis of the Gulf States, lies on both sides of the Mississippi river, 107 m. from its mouth. It is 960 m. in direct line s.w. of Washington, and 700 m. s. of St. Louis. New Orleans is an important railroad center. The principal roads are the Ill. Cent., Southern Pacific, L. &. N., Texas & Pacific, New Orleans & Northeastern and the Yazoo & Miss. Valley. The city commands 20,000 miles of steamboat navigation, the Mississippi and its tributaries. Steamship lines connect with Boston, New York and Philadelphia; also with Mexico, South and Central American ports, Bremen, Liverpool and Havre. New Orleans is the greatest cotton market in the world, except Liverpool. The foreign export trade surpasses that of every other American port except New York. The chief exports are cotton, sugar, rice, breadstuffs, tobacco and lumber. In 1900, the exports were valued at $118,858,764. The chief industries are refining of sugar, barreling of rice, manufacture of cottonseed oil and cake, of tobacco and of lumber and staves. New Orleans was founded by the French in 1718, was an important base of operations during the Civil War and a scene of excitement during the period of "reconstruction." During the last twenty-five years, its prosperity has been almost unbroken. The difficulty of drainage is being met by a series of street canals and a system of pumping stations. The work was begun in 1897, but is still unfinished. A unique feature of New Orleans is the annual Mardi-gras carnival. The Cotton Exposition in 1884-5 was an event of commercial value to the city. Population 1900. 287,104.

New Philadelphia, Tuscarawas co., O., on the Tuscarawas river, 80 mi. s. of Cleveland. Railroads: C. L. & W., C. & P., C. & M. Industries: iron and steel company, roofing tile, broom, wire nail and shirt factories. Pop. 1900, 6,213.

Newport, Campbell co., Ky., on the Ohio river, opposite Cincinnati. Railroads: Chesapeake & Ohio and Louisville & Nashville. Industries: rolling mills, bolt and nut works and watch case factory. Pop. 1900, 28,301.

Newport News, Warwick co , Va., on the north side of Hampton Roads, near the mouth of the James river. Railroad, Chesapeake & Ohio. Peanuts are extensively cultivated in the vicinity. Exports include cotton, lumber, wheat, flour, tobacco, ets. Pop. 1900, 19,635.

Newport, Newport co., R. I., on Narragansett Bay and Atlantic Ocean, 30 m. s. of Providence. Railroad: N Y. N. H. & H. Industries: web company and some small factories. Newport is a noted watering place. The town was settled in 1639, and was until 1899 one of the capitals of the state. The "Old Stone Mill" in Touro Park is an object of much interest. Some think it was built by Northmen in the eleventh century. Pop. 1900, 22,034.

New Rochelle, Westchester co., N. Y., on Long Island Sound, 17 mi. from New York City. Railroads: N. Y. & N. H , and Harlem River Branch. Industries: press company and two scale factories. Surrounding country agricultural. Pop. 1900, 14,720.

New South Wales, a state of the Australian Commonwealth. Area 323,437 sq. mi. The most important rivers are on the west side of

the great watershed, the chief being the Murray, the Murrumbidgee, the Lachlan, and the Darling, the Murray receiving the waters of the others and carrying them to the sea through South Australia. As a general rule the prevailing rock on the east side of the mountains is sandstone, and on the west granite. Much of the sandstone belongs to the Carboniferous system, and is accompanied with workable seams of excellent coal. The coal fields extend over an area of 10,000,000 acres, with an output of 4,037,929 tons. Copper ore of the richest quality has been found in great abundance, but is not yet extensively worked. Tin exists in large quantities, and iron is very generally distributed. But the chief mineral product of the colony has been gold, the total value of which hitherto obtained was $200,000,000. Silver and lead have also been found. The scarcity of water renders much of the surface far better adapted for pasturage than for agricultural purposes, though where the necessary moisture is present heavy crops are obtained. The agricultural land is chiefly under wheat and maize, oats and barley, and there is also a considerable area under sugar, vines, fruit trees, etc. Fruits and vegetables in great variety are grown. But the rearing of sheep and cattle are the chief employments of the people, and wool is the most important article of export. There are about 40,000,000 sheep in the colony. Some exports are gold coin, tin, sheep and cattle, tallow, coal, copper, etc. The imports are wearing apparel, iron goods and hardware, wine, spirits, and beer, sugar and tea, etc. The manufacturing industries of the colony are naturally not of much importance as yet, but they are increasing; and the industrial works embrace tanneries, woolen factories, soap and candle works, breweries, steam sawmills, shipyards, foundries, machine works, clothing factories, etc. There are 2,896 mi. of railway open, besides what is in course of construction; the telegraphic wires extend over 14,500 mi. The constitution of New South Wales vests the legislative power in a parliament of two houses, namely, the Legislative Council and the Legislative Assembly. The former consists of not fewer than 21 (July, 1901, 69) members nominated by the crown for life; and the latter of 125 members chosen triennially by 125 constituencies on a basis of manhood suffrage. The executive consists of a governor nominated by the crown, assisted by a council composed of colonial secretary, colonial treasurer, the ministers for lands, public works, justice, and other high functionaries. Sydney is the capital; other towns are Newcastle, Bathurst, Goulburn, Paramatta, Maitland. Primary education is compulsory (but not quite free) between the ages of 14 and 16. The educational system comprises lower and higher public schools, evening schools, etc., at the top being the University of Sydney. With it are affiliated three theological colleges, for Church of England, Presbyterian, and Roman Catholic students respectively. The colony has taken measures for its own defense, and has a force, partly paid, partly volunteer, numbering more than 9,230, and including infantry, cavalry, artillery, engineers, naval brigade, etc. New South Wales was discovered by Captain Cook in 1770, and founded as a penal settlement (at Botany Bay) in 1788. One of its early governors was the notorious Captain Bligh, who was deposed by the colonists in 1808. The most important events in its history since convict immigration ceased in 1840 are the establishment of representative institutions in 1843; the erection of Victoria into a separate colony in 1850; the important discovery in May, 1851, of extensive auriferous tracts and the rush to the gold diggings, with consequent great increase in population and prosperity. The first railway, from Sydney to Paramatta, was opened in 1855. Among more recent events are the Sydney Exhibition held in 1879, and the Intercolonial Conference held at Sydney in 1883. A bill to change the name of the colony to Australia was introduced in 1887. New South Wales has not yet seen her way to take advantage of the Federal Council act of Australasia, passed by the imperial Parliament in 1885. The colony celebrated its centenary in January, 1888, and a special series of stamps of elaborate design was issued in commemoration of the event. Pop. 1,359,537.

Newspaper, a sheet of paper printed and distributed at short intervals for conveying intelligence of passing events. This is a definition of a newspaper which might safely be employed for legal purposes; but it is altogether inadequate to describe the great institution which is now, in all parts of the civilized and semi-civilized world, at once the bearer of tidings, the herald of commerce, and, according to the predilections of its readers, a more or less accepted guide in matters of politics, theology, morals, arts, and sports.

The number of newspapers of the world is (1903) estimated at 50,000, of which 20,493 appear in the U. S., and 27,510 in Europe. Canada has 958 and Japan 2,000. In Europe, Great Britain leads with 9,500; then comes Germany with 7,500; France with 4,500; Italy with 1,500; Austria-Hungary, 1,200; Spain, 850; Russia, 800; Greece, 600; Switzerland, 450; Holland and Belgium, 600. Of these more than half are printed in the English language. About 800 are printed in Australia, 1,700 in South America, 200 in Africa, 1,000 in Asia outside of Japan, and 3 in the Sandwich Islands. Next to the English language comes the German with about 20 per cent of the total number of publications, then follow French, Spanish and Italian in the order named. In 1900 the total circulation in the U. S. was 114,299,334; total no. copies, 8,168,148,749; no. wage earners, 94,604; wages, $50,333,051; lbs. paper used, 1,233,142,248; income from advertising, $95,861,127; income from sales, $79,928,483.

The newspaper came into existence when accounts of the imperial armies of Rome were sent to the generals in command in all parts of the provinces. These *Acta Diurna* were communicated by the generals to the officers under their command, and thus the foundation of a

system of newspaper circulation was laid. It is to Germany that we have to look for the beginnings of modern European journalism. As early as the fifteenth century small newssheets in the form of letters were issued in Augsburg, Vienna, Ratisbon, and Nuremberg. It was not until 1566, however, when the official *Notizie Scritte* were established at Venice by order of the Venetian government, that a news-sheet at all answering to present ideas was produced. At first they were written, and exhibited in public places, any one being permitted to read them on payment of the small coin called a *Gazette*. From these journals acquired the title *Gazette*, and the demand for them was so great that it became necessary to print them. Gazettes were soon afterward issued in most of the leading cities of Europe.

The *Weekly News* of 1662, edited by Nathaniel Butter, is, so far as positive evidence goes, the first English newspaper, as we understand the term. The *London Weekly Courant* made its appearance in the same year. During the protectorate the newspaper enjoyed the luxury of freedom, and there was a great increase in the number of political journals. A newspaper censorship, begun in 1662, was continued with more or less stringency during the reign of Charles II and down to 1695, when the press licensing law was abolished. During that period there was no newspaper that could be properly so called except the *London Gazette*, which, as Macaulay puts it, "contained nothing but what the secretary of state wished the nation to know." Comments on political events rather than news formed the staple of such periodicals as were published during the existence of the censorship. It was not until 1702 that a daily paper was put forth in England. This was the *Daily Courant*, a small sheet printed on one side only.

Advertisements which now form so important a factor in the prosperity of newspapers, did not appear in any journal, so far as can be ascertained, until toward the middle of the seventeenth century. Occasional books and pamphlets were advertised in 1647–48, and in 1649 a reward was offered in the *Moderate* for the recovery of a "piebald nag;" but it was not until 1673 that anything like a regular system of advertising was established, when the *Index Intelligencer* opened its columns to paid announcements, at the rate of "a shilling for a horse or coach for notification, and sixpence for renewing." A little later the *Observer Reformed* was prepared to insert eight lines for a shilling; but as the people began to awaken to the value of this new medium of publicity, the government became equally alive to its value to the revenue, and in 1701 imposed a duty of one shilling for each advertisement. In 1712 a tax of one halfpenny per sheet was imposed on every newspaper of a sheet and a half. This tax was gradually increased to fourpence in 1815. With these heavy taxes there was a corresponding increase in their cost until the price reached sevenpence, a condition which lasted until 1836, when the duty was reduced, and entirely abolished in 1855. The first half of the eighteenth century saw a striking extension of journalistic enterprise. It was in 1762 that the *North Briton* was first issued by John Wilkes, No. 45 of that notorious journal being the one which was burned by the hangman, and for which Wilkes was put in the Tower and cast in heavy damages. The *Times* —one of the chief and central figures of modern journalism—was started in 1788, as a development of the *Daily Universal Register*, which has existed from 1785.

The earliest newspaper published in America was *Publick Ocurrences*, 1690; this was followed in 1704 by the *Boston News-Letter*, which continued without a rival until 1719, when the *Boston Gazette* was issued "by authority." Later on the *News-Letter* extended its title, and became the *Massachusetts Gazette and Boston News-Letter*, and was conspicuous for its support of the British in the early days of the War of Independence, ceasing to exist, however, when the English troops evacuated Boston. In 1721 the *New England Courant* was established by James Franklin, and subsequently was conducted by his more renowned brother, Benjamin Franklin. The latter started a paper of his own, the *Pennsylvania Gazette*, in 1729, after the death of the *Courant*, and this appeared weekly down to 1745, when it merged in the *North American*. Edes's *Boston Gazette* begun in 1755, was the medium through which John Adams published his *Letters of Novanglus*. At the Revolution the New England colonies possessed 14 newspapers: Pennsylvania, 9; New York, 4; and the middle and southern colonies, 10. All save the semi-weekly *Advertiser* of Philadelphia were published weekly. From this period onward the progress of American journalism was marked by rapid strides, developing an originality all its own, and displaying an activity in some directions altogether outdistancing the achievements of other countries. The organization and equipment of the leading papers are most complete, including an editorial and reportorial staff of many subdivisions, backed by a proprietary of remarkable vigor and enterprise. The *Herald*, originated by James Gordon Bennett; the *Tribune*, founded by Horace Greeley, the *World*, the *Times*, the *Sun* are the chief papers of New York; and in Chicago, Boston, Baltimore, Cincinnati, Philadelphia, St. Louis, San Francisco, and other cities, there are journals hardly less famous. The Sunday paper has long been a specially popular production. Nearly every prominent daily in the states issues its enlarged Sunday edition, which in addition to its news proper contains a vast amount of miscellaneous reading, culled from all kinds of sources, and often including special contributions of great merit.

In 1903 there were issued in the United States and Canada a total number of 21,451 newspapers and periodical publications, consisting of 15,129 weeklies, 2,824 monthlies, 2,331 dailies, 281 semi-monthlies, 535 semi-weeklies, 163 quarterlies, 59 bi-weeklies, 70 bi-monthlies, 55 triweeklies. The geographical distribution of the 21,451 periodicals is as follows: New York

state, 1,953; Illinois, 1,688; Pennsylvania, 1,381; Ohio, 1,173; Iowa, 1,060; Missouri, 984; Canada, 958; Indiana, 832; Michigan, 792; Texas, 770; Minnesota, 705; Kansas, 693; California, 684; Wisconsin, 677; Nebraska, 604; Massachusetts, 565; New Jersey, 376; Colorado, 347; Georgia, 344; Kentucky, 310; South Dakota, 273; Tennessee, 269; Arkansas, 256; Washington, 248; North Carolina, 246; Alabama, 233; Virginia, 226; Mississippi, 224; Oklahoma, 210; West Virginia, 203; Oregon, 200; Maryland, 198; Louisiana, 188; North Dakota, 177; Connecticut, 164; Maine, 164; Florida, 145; South Carolina, 138; Indian Territory, 118; Montana, 91; New Hampshire, 90; Idaho, 85; Utah, 77; Vermont, 74; District of Columbia, 72; Arizona, 56; Rhode Island, 56; New Mexico, 53; Delaware, 38; Wyoming, 38; Nevada, 30; Alaska, 10.

The rapid increase in the number of periodicals in the United States and Canada during the past few years may be seen by comparing the following summary (for the year 1890), with the one just given. Total (1890), 17,760; weeklies, 13,164; monthlies, 2,191; dailies, 1,626; semi-monthlies, 280; semi-weeklies, 217; quarterlies, 126; bi-weeklies, 82; bi-monthlies, 38; tri-weeklies, 36. New York had 1,778; Illinois was second with 1,309; Pennsylvania was third with 1,281; Ohio fourth with 1,043. Canada had but 812 publications, of which Ontaria had fully 70 per cent; Quebec was second; Manitoba and Nova Scotia followed in order named, and the other provinces each added a few to the list.

The first newspaper printed in Scotland was the *Mercurius Politicus*, issued in 1653. The *Mercurius Caledonius* had a three months' existence in 1661. The first newspaper actually published in Ireland was the Dublin *News-Letter*, in 1685.

The increase of rapid communication generally, the development of telegraphic communication, and the system of telegraphic news agencies, established first by Julius Reuter in 1849, the vast improvement in printing, the repeal of the stamp duty (originally imposed in 1712) in 1855, and of the paper duty in 1861, and the enormous growth of advertisements, have given a great impetus to this branch of literature. Penny weekly and penny daily papers are now exceedingly numerous. Special industries and professions are now represented by organs of their own, and the number of special illustrated domestic and literary papers is enormous. The press has had an extraordinary development since the middle of the century, and many of the organs in the large towns are conspicuous for enterprise and influence. See *Associated Press*.

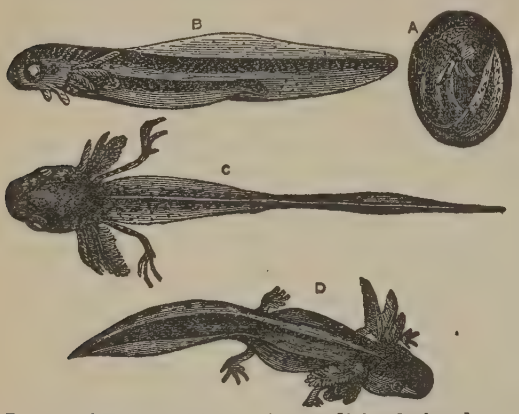
The Boston *News-Letter*, started in 1704, was the first regularly established American newspaper. By the commencement of the Revolutionary War in 1775 the number of newspapers published in the New England states amounted to thirteen. In 1903 there were published in the U. S. about 2,275 daily, and 15,800 semi-weekly and weekly newspapers. Since 1840 New York has been the acknowledged metropolis of the newspaper and periodical press of America. The most widely circulated are the New York *Herald*, the *World*, the *News*, the *Morning Journal*. The *Herald* was begun in 1835 by Mr. James Gordon Bennet, a native of Scotland, and the enterprise shown in its management has never been exceeded in the history of the newspaper press. In 1841 the *Tribune* was begun by Mr. Horace Greeley, under whose management it acquired a high reputation. The New York *Times* was established in 1850. In Australia and New Zealand there are about 800 newspapers, and the leading papers, in size, appearance, and contents, compare favorably with the best. The first paper published was the Sydney *Gazette* (1803–43). In the Cape Colony the press is of the same vigorous and important character; while in India, besides the great exponents of English news published in the capital, there are all over the vast empire important local papers for English-speaking readers. The first newspaper in the English language appeared in Bengal in 1780. There are upward of 360 newspapers published in the various vernacular languages, the latter being under a certain measure of restraint (Vernacular Press act, 1878).

The first newspaper established in France was the *Gazette de France*, published under the patronage of Richelieu in 1631, by Theophraste Renaudot, a physician. It continued to appear till Aug. 24, 1848, when it was suspended; but it was resumed and has continued to exist under various names. An immense impetus was given to the French newspaper press by the revolution, but of all the newspapers commenced at this eventful period the only ones which have survived to the present day are the *Journal des Débats* and the *Moniteur*. At present the daily press of Paris represents all shades of political opinion, and some of the papers have phenomenal circulations, but as regards the amount and value of the matter they contain they are generally far behind those of the English-speaking countries. In Germany the first regular newspaper was commenced at Frankfort in 1615, under the title of the *Frankfurter Oberpostamtszeitung*. By the end of the seventeenth century all the principal towns of Germany had their newspapers, but previous to the French Revolution their circulation was inconsiderable. The first number of the *Allgemeine Zeitung* was published in 1798, and it soon rose to the highest position in the ranks of German journalism, a place which it still maintains. Other leading German dailies are the *Kölnische Zeitung* (*Cologne Gazette*) and the *National Zeitung*. The *Illustrirte Zeitung* is an illustrated weekly, similar to the London *News* and *Graphic*. In Austria the number of newspapers is comparatively small. Some of the newspapers of Belgium and Holland are conducted with great ability. The press of Italy, of Spain, of Sweden and Norway, and of Denmark, is, in each instance, comparatively of less importance. The *Journal de St. Petersbourg*, in French, has a considerable circulation outside

Newspaper

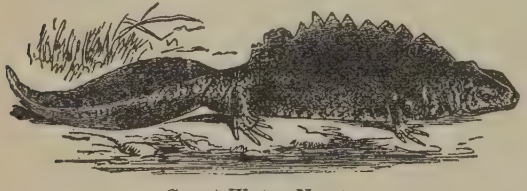
of Russia. Turkey and Greece are now in possession of numerous journals.

Newt (or Eft), the popular name applied to various genera of amphibians included in the order Uıodela ("tailed") of that class. Water



Larvæ of *Triton cristatus*; *A.*—condition before leaving the egg; *B.*—tadpole shortly after it is hatched; *C.*—at about the twenty-second day; *D.*—at about the forty-second day.

newts, or "water salamanders" as they are sometimes termed, possess a compressed tail, adapted for swimming. These forms are oviparous, and though aquatic in their habits they are yet strict air breathers. The larval gills are cast off on maturity being reached, or about the third month of existence. The larval tail is retained throughout life. The male animals are distinguished by the possession of a crest or fleshy ridge borne on the back. The food consists chiefly of aquatic insects, larvæ, etc. The *Triton cristātus*, or great water newt, is about 6 in. in length; the *Triton aquaticus* averages about 3 in.; and both are common in freshwater pools and ponds in Britain. The land newts are included under the genus *Salaman-*



Great Water Newt.

dra. The tail is of rounded or cylindrical form, and is therefore not adapted for swimming. The land newts possess cutaneous glands which secrete a fluid of watery nature; and the popular superstition that if put on a fire these creatures were able to extinguish the flames may have taken origin from the abundant secretion of these glands. *Salamandra maculosa* of Southern Europe is a familiar species, as also is the *S. alpīna* found inhabiting mountainous situations. These forms possess the power of reproducing lost or mutilated toes or even limbs. The newt is quite harmless.

Newton, Harvey co., Kan., on Sand Creek, 201 mi. w. of Kansas City. Railroads: A. T. & S. F.; and Missouri Pacific. Industries: three flouring mills; iron foundry; butter, soap, engine, broom, and candy factories. Surrounding country agricultural. The town was first settled in 1871 and became a city in 1872. Pop. 1900, 6,208.

Newton, Middlesex co., Mass., on Charles River, 7 mi. w. of Boston. Railroad, Boston & Albany. Industries: worsted mills, rubber works, cordage mills, machine works, silk mill, dry plate co., starch factory, and chemical co. The town was first settled in 1630 and became a city in 1873. Pop. 1900, 33,587.

Newton, Sir Isaac (1642–1727), the most distinguished mathematician of modern times, was b. at Woolsthorpe, Lincolnshire. He was sent at an early age to the village school, and in his twelfth year to the town of Grantham, where he remained till he was entered at Trinity College, Cambridge, in 1660. In 1663–64 he discovered the formula known as Newton's Binomial Theorem; and before 1665 he had established his doctrine of fluxions. Some years later Leibnitz also discovered this invaluable method, and presented it to the world in a different form — that of the differential calculus. About this time (1665), being obliged to quit Cambridge on account of the plague, he retired to Woolsthorpe, where the idea of universal gravitation is said to have first presented itself to him, from observing the fall of an apple in his garden. In 1666 he returned to Cambridge, was chosen fellow of his college (Trinity College) in 1667, and the next year was admitted A.M. By this time his attention had been drawn to the phenomena of the refraction of light through prisms, and to the improvement of telescopes. In 1669, being appointed professor of mathematics at Cambridge, and preparing to lecture on optics, he endeavored to mature his first results, and composed a treatise on the subject. In 1672 Newton was chosen a fellow of the Royal Society, to which he communicated a description of a new arrangement for reflecting telescopes, which rendered them more convenient by diminishing their length without weakening their magnifying powers; and soon after, the first part of his labors on the analysis of light. This led him into controversies with Hooke, Huygens, and several eminent foreigners, Newton maintaining the corpuscular theory, now generally given up in favor of the undulatory theory. In 1675 he addressed another paper to the Royal Society, completing the account of his results and of his views on the nature of light. This treatise, united with his first paper on the analysis of light, afterward served as the base of the great work, *Treatise on Optics* (1704). He had before this deduced from the laws of Kepler the important law that gravity decreased with the square of the distance, a law to which Sir Christopher Wren, Halley, and Hooke had all been led by independent study. No demonstration of it, however, had been given, and no proof obtained that the same power which made the apple to fall was that which retained the moon and the other planets in their orbits. Adopting the ordinary measure of the earth's radius,

Newton had been led to the conclusion that the force which kept the moon in her orbit, if the same as gravity, was one sixth greater than that which is actually observed, a result which perplexed him, and prevented him from communicating to his friends the great speculation in which he was engaged. In June, 1682, however, he had heard of Picard's more accurate measure of the earth's diameter, and repeating with this measure his former calculations, he found, to his extreme delight, that the force of gravity, by which bodies fall at the earth's surface, 4,000 mi. from the earth's center, when diminished as the square of 240,000 mi., the moon's distance, was almost exactly equal to that which kept the moon in her orbit. Hence it followed that the same power retained all the other satellites round their primaries, and all the primaries round the sun. Two years were spent in penetrating the consequences of this discovery, and in preparing his immortal work, *Philosophiæ Naturalis Principia Mathematica*, commonly called *Newton's Principia*, which was published in 1687. In his later years he took great interest in chemistry, and in the elucidation of the sacred Scriptures. His health was good until his eightieth year, when he suffered from a calculus disorder, which occasioned his death. He was interred in Westminster Abbey. The most important of Newton's philosophical works are his *Principia*, *Arithmetica Universalis*, *Geometria Analytica*, *Treatise on Optics* and *Lectiones Opticæ*. Other works are his *Chronology*, *Observations on the Prophecies of Holy Writ, and Historical Account of two Notable Corruptions of Scripture.*

New York (nu york′), the *Empire State*, of the North Atlantic group, one of the original thirteen states of the Union; is bounded on the n. by Lake Ontario and the province of Ontario, on the e. by Vermont, Massachusetts and Connecticut, on the s. by the Atlantic ocean, New Jersey and Pennsylvania, and on the w. by Pennsylvania, Lake Erie and the province of Ontario. The extreme measurements are 311¾ m. from n. to s. and 412 from w. to e., including Long Island; the gross area, 47,520 sq. m. The population in 1900 was 7,268,012, of which 99,232 were negroes, 7,170 Chinese and 5,257 Indians. New York is first in the Union in wealth and population.

Surface.—The surface is more diversified than that of any other state in the Union. It is traversed by numerous chains of mountains and hills, among which lie beautiful, fertile valleys. There is also much rolling land and several extensive plains. From the highland region in the e. and n. e., the land slopes gradually toward Lake Ontario. The mountains belong to the Appalachian system; the principal ranges are the Adirondacks, the Catskills and the Highlands of the Hudson, of which the Adirondack is the most prominent. Mt. Marcy in that range is 5,379 ft. high. The Mohawk valley furnishes the single pathway from e. to w. between the hills and mountains. The trend of the interior waters of New York is determined mainly by its mountains and hills. The principal rivers of the state are the Hudson, which is the largest, and the waters of which run to all points of the compass; the Mohawk, flowing 135 m. from the w. into the Hudson; the Genesee, which flows n. across the state into Lake Ontario; on the n. boundary the St. Lawrence, on the s. the Delaware and on the w. the Niagara river. There are many grand and picturesque falls, especially Niagara, on the river between Lake Erie and Lake Ontario. Among the many lakes of New York are Lake Champlain on the n.e. boundary, lakes Oneida, Cayuga, Seneca and Chautauqua. Islands are abundant. Manhattan Island is occupied by the busy part of New York City. Long Island and Staten Island are the largest of groups in waters adjacent to the ocean. In the St. Lawrence are the Thousand Islands, and Lake George is beautified by islands of various sizes.

Climate.—The climate of New York is varied, with a range wider than that of any other of the Atlantic states. Those portions which are under the influence of ocean, sound and lake winds are more even in temperature. Other regions suffer severely from the early frosts of autumn and the late frosts of spring, from extremes of heat in summer and of cold in winter. In the Adirondack region the summer is delightful, but the winters are long and severe, with heavy snows. The mean annual temperature of the state is 47°; the average annual fall of water in rain and snow is about 41 in.

Mining.—The most important mineral products are iron ore, clay, cement rock, building-stone and salt. In the production of iron ore, the state ranks eighth in the U. S., the output of its mines, according to the census of 1900, being 443,790 long tons, valued at $1,241,981. In the production of building-stone New York ranks fourth. The limestone quarried in 1900 was valued at $1,545,699; marble, at $338,816; sandstone, at $1,218,053; granite, at $306,711; slate, at $76,675. In the production of salt, New York has held first place since 1893. The yield in 1900 was 7,489,105 barrels, or 38 per cent of the production of the whole U. S. The annual output of bricks is valued at $8,500,000. Half the hydraulic cement of the U. S. is produced in New York, the yield in 1900 being valued at $3,522,079.

Agriculture.—About one-half of the area of the state is adapted to cultivation, and the products include nearly all those of the temperate zone. The principal crops are buckwheat, corn, wheat, oats, rye, barley, hay and tobacco. The state ranks second in the Union in the production of buckwheat, first in hay and forage crops and first in vegetables. New York produces more potatoes than any other state. It ranks first in dairy products, these being valued in 1900 at $55,474,155 Out of 39,171,270 lbs. of hops produced in the census year in the U. S., New York produced 20,063,029 lbs. It ranks fourth as an agricultural state, with products valued at $245,270,600. On Long Island, and in less degree near all the cities, market-gardens thrive. In the central and western parts, apples, plums,

pears and cherries are plentiful in favorable years, and in the south and west peaches are raised, while grapes are cultivated along the Hudson and the interior lakes to the west.

Manufactures.—Manufacturing is the leading industry of the state, and in the value and variety of its manufactures New York is the foremost state of the Union. Hardly an industry permissible in the temperate zone is unrepresented. The total gross value of industrial products in 1900 was $2,175,776,900, an increase of 27.1 per cent during the last decade. Much more than one-half of the industrial business of the state is carried on in Greater New York, the capital invested there in mercantile industries being $922,125,581; the gross value of products being $1,371,396,468. Outside of Greater New York, Buffalo is the largest manufacturing city, with products in 1900 valued at $122,230,061. Rochester follows Buffalo in the value of its industries, the gross value of its products in 1900 being $69,129,820. Syracuse, Troy, Utica, Albany, Binghamton, Yonkers and Long Island City have also important manufactures. Schenectady has dynamos and locomotives; Ballston Spa, paper mills; Cohoes, hosiery and underwear; Oswego, flour mills; Elmira, car shops; and Amsterdam, knit goods. The fisheries of the state are of great importance.

Transportation.—In 1900, the railway mileage of New York was 8,114.98. The great railway systems of the state are: the New York Central & Hudson River, with its many leased lines and branches; N. Y., L. E. & W., D., L. & W., West Shore, Delaware & Hudson Canal Company, N. Y. Susquehanna & Western, N. Y. Ontario & Western, N. Y. Chicago & St. Louis, and the N. Y. N. H. & H. with their numerous branches. The N. Y. C. & Hudson R., one of the grandest scenic routes on the continent, has probably the most rapid train service in the world. The canals of the state have been a source of great gain, but their mileage has been greatly reduced since the extension of the railway systems. The canals now in operation are the Erie, the Champlain, the Oswego, the Cayuga and Seneca, and the Black River. The bridges include some remarkable engineering works, notably the Poughkeepsie, the Portage and the Brooklyn bridges; and the East River bridge, which is now in process of construction. Buffalo is the chief lake port. The internal commerce is extensive, of which over half passes over the railroads and the remainder through the canals, lakes and sounds. The maritime commerce of New York is in large part that of the nation, as its chief port, New York City, serves not only for the state but for much of the continent. There are in the state twelve customs districts, which had in 1900 exports valued at $558,396,424 and imports valued at $564,117,342. The total tonnage was 19,923,267, of which 16,020,290 pertains to New York City.

Education.—The regents of the University of New York have supervision of education in the state; they are elected by the legislature on joint ballot. Charters of colleges, universities, academies, libraries and museums proceed from them. The superintendent of public instruction, elected by the legislature, is the head of the common school system. The total expenditure for schools in 1900 was $28,052,990. Among the many fine normal schools are the state normal at Albany and the City Normal College in New York. Higher institutions of learning are Columbia University, New York University and New York College in New York; Cornell University at Ithaca, Colgate at Hamilton, Hamilton at Clinton, Syracuse University, Vassar at Poughkeepsie (for women), and about thirty more colleges and universities. At West Point on the Hudson is the U. S. Military Academy, founded in 1802. There are numerous libraries and educational societies in the state. The total expenditure for charitable, correctional and reformatory institutions in 1900 was $1,408,003.22. A superintendent of state prisons has charge of the institutions at Auburn, Clinton and Sing Sing. The expenditures for the year 1900 were $460,528.02.

History—In 1609, Samuel Champlain discovered the lake which bears his name, and was probably the first white man to enter the territory now New York. In the same year, Henry Hudson explored the Hudson river as far as the present site of Albany. The Dutch carried on fur trade with the Indians, with no serious attempt at colonization until after the formation of the Dutch West India Company, 1621. In 1623, New Amsterdam was settled. The Dutch governors were Minuit, Van Twiller, Kieft and Peter Stuyvesant. The colony carried on an extensive fur trade and also raised tobacco and wheat. In 1664, Nicolls captured the colony for the English, who changed its name from New Netherlands to New York. Except for a brief period in 1673, the English retained possession of the colony until the Revolution. In the events directly preceding the Revolution, New York took a prominent part. In 1777, the first state constitution was adopted, and the national constitution in 1788. In 1825, the Erie canal was opened, and in the following year the first railroad, the Hudson and Mohawk, was chartered. During the Civil War, the state furnished 467,077 troops to the Union army. The physical structure and location of New York has made it a most important factor in the development of the nation. In population, wealth and political influence it has since 1820 held pre-eminence. No other state has so many large cities and thriving towns. New York City, the metropolis of the state and nation, is second only to London in population and commercial interests. The principal cities, with their population in 1900, are: Albany, the capital, 94,157; New York City, 3,437,202; Buffalo, 352,387; Rochester, 162,608; Syracuse, 108,374; Troy, 60,651; and Utica, 56,383.

New York, the largest city of the Western Hemisphere and, next to London, the largest in the world. It is in the State of New York

New York

and is situated at the mouth of the Hudson River, which enters the Atlantic Ocean through New Yor Bay. The Harbor is one of the finest in the world and is about five miles wide and six miles long from north to south. It has an entrance about a mile wide known as the Narrows, between Fort Hamilton and Fort Wadsworth. On Bedloe's Island, north of the center of the Bay, is the bronze *Liberty Enlightening the World*, by Bartholdi. This is the largest statue of modern times, being 151.41 ft. high with a pedestal 155 ft. high. Governor's Island and Ellis Island, near the Battery, both belong to the U. S. Government, the former being used for military purposes and the latter as a landing for immigrants. North and east and south of the Bay lies the city, which consists of five boroughs: Queens, Brooklyn, Richmond, the Bronx and Manhattan. Manhattan, consisting of Manhattan Island and several adjacent islets, stretches north of the Harbor between the Hudson and East rivers and contains the chief offices, business houses, museums, tenements and palaces of the city. The borough of Brooklyn, east of the Bay, is coextensive with Kings County. (See *Brooklyn*). The Borough of Queens, stretching north and east of Brooklyn on Long Island, is noted for its great industrial establishments, especially in Long Island City. The Bronx, north of Manhattan, and Richmond, south of the bay, are mainly residence districts. Brooklyn, Queens and Richmond are all noted for their seaside resorts. The total area of the city is 309 square miles. It lies 190 miles southwest of Boston, 205 miles northeast of Washington, 715 miles east of Chicago and about 2,700 east of San Francisco.

Transportation and Intercommunication.—There are numerous railroads connecting New York with other cities of the United States; ships from all parts of the world enter her harbor, and submarine cables provide for rapid communication with foreign cities in every land. The principal railways are the Erie, N. Y. Cent. & Hud. Riv., Pennsylvania, West Shore, B. & O., and N. Y., New Haven & Hartford. The Hudson River and the Erie Canal also afford excellent advantages for internal transportation. Within the limits of New York City there are car lines on almost all the thoroughfares leading north from the business district. But these together with the extensive ferry system and several elevated railways having proved entirely inadequate for the traffic, in January, 1900, a contract was awarded for the construction of an underground rapid transit railway system, running from one end of Manhattan to the other, with a branch to the Bronx to be completed in four and one-half years. A number of extensions of this line have been proposed and one to Brooklyn is being constructed. Among the many handsome and costly bridges which span the rivers of the city, the most famous are the Brooklyn Bridge (see *Bridge*), the new East River Bridge over the East River; and over the Harlem River, the Washington Bridge and the High Bridge which carries the old Croton Aqueduct.

Industries and Commerce.—New York stands unrivaled as a center of the wholesale dry-goods and wholesale grocery business. The value of her manufactured products is more than 50 per cent greater than that of any other American city, aggregating $1,371,358,000 in 1900. The most important industry is the manufacture of clothing. Other industries in the order of their importance are sugar and molasses refining, printing and publishing, the manufacture of foundry and machine-shop products, malt liquors and tobacco products and the roasting and grinding of coffee and spices.

The foreign commerce of the port of New York is about five times that of any other American port. It imports a great deal of sugar and the bulk of the manufactured goods, and exports a large part of the copper and most of the machinery. Over 800 sail and about 3,000 steam vessels engaged in foreign trade clear the port annually. The volume of the coastwise trade far surpasses that of the foreign commerce.

Streets and Buildings.—With the exception of the southern end of Manhattan Island, New York is laid out quite regularly. The principal street is Broadway, running north from the Battery. Toward its southern end are the largest banks and great commercial houses, while farther up is the retail shopping district, and north of that the houses of the well-to-do classes. On the East Side is the tenement house district and on the West along the Hudson are manufacturing plants and gas houses. Parallel with Broadway, extending from Chatham Square to Cooper Union, is a broad avenue called the Bowery. This street was once notorious as the rendezvous of the lawless "Bowery Boy" and is still characterized by a mixed population and a multitude of cheap shops and questionable resorts. Fifth Avenue, once occupied solely by residences of the rich, now has many business houses as far as Fiftieth Street; above that are some of the finest churches, club-houses, hotels and palaces in the city. Riverside Drive along the Hudson is one of the most beautiful avenues in the world. Washington Heights, a rocky ridge rising abruptly from the Hudson, is another picturesque residence district.

Beginning at the Battery, the first building of importance is the Produce Exchange and opposite it on Bowling Green, the new Custom House. North of this is the old Trinity Church, which, with its churchyard, is one of the most interesting places in the city. From Trinity Church running east is Wall Street, a narrow thoroughfare lined with buildings from 12 to 20 stories high, used by banks and other financial institutions. On Broad Street is the new Stock Exchange, a handsome $2,000,000 building. The Clearing-House in Cedar Street, near Broadway, is a beautiful white marble structure. On Liberty Street is the fine Chamber of Commerce, and at the

junction of Park Row and Broadway stands the Post Office.

Opposite the Post Office is St. Paul's Chapel, where Washington's pew is shown. Other interesting churches are: Grace Church, on Broadway, an ornate Gothic structure of white limestone; Saint George's Church, with its lofty spires, on Stuyvesant Square; and Saint Patrick's Cathedral (R. C.), on Fifth Avenue. The Cathedral ranks among the most imposing Gothic edifices in this country. It is built of white marble in the form of a Latin cross and its two beautiful spires rise to a height of 323 feet. This church was begun in 1859 and dedicated in 1879. Its cost was $2,000,000. The new Episcopal Cathedral of St. John the Divine, on a rocky bluff overlooking Harlem plains, will probably be completed in from thirty to fifty years. It is to cost from ten to twenty millions of dollars and in vastness of dimensions and beauty of design will take its place among the great cathedrals of the world.

Above the Post Office in City Hall Park is the City Hall, one of the finest of New York's older buildings. Back of it is the County Court House, a marble building in Corinthian style, and almost opposite is the new and palatial Hall of Records. Near by on the east are the entrance to the Brooklyn Bridge, and the immense *World*, *Tribune* and *Times* buildings, while on the west are the lofty structures of the Postal Telegraph and the Home Insurance. The city prison, known as The Tombs, on Center Street, is architecturally one of the finest of modern prisons. Other fine buildings are the massive structure of the New York Life Insurance on upper Broadway; the Cooper Union at Fourth Avenue and Eighth Street; the New York University Building in Washington Square; the *Herald* building, in Venetian style, on Thirty-fifth Street; the imposing marble building at the corner of Twenty-fifth and Madison used by the Appellate Division of the Supreme Court; the magnificent Library of Columbia University on 116th Street; the National Academy of Design on 109th and 110th; the Museum of Natural History on Seventy-seventh Street, facing Central Park; the Metropolitan Museum of Art on the east side of the Park, and the Lenox Library, also fronting the Park. The famous "Flatiron," a twenty-story wedge-shaped building, is built on a triangle at the angle of Broadway and Fifth Avenue. The contrast is striking between this building and the neighboring Madison Square Garden with its graceful tower surmounted by a gilded statue of Diana. The tomb of General Grant is at 123d Street and Riverside Drive, on a bluff overlooking the Hudson. It is a mausoleum in classic style, covering an area about 100 feet square and rising to a height of 160 feet.

On Broadway above Fifty-ninth Street are many fine apartment hotels; one of the largest is the Ansonia, which is 16 stories high and covers a plot of land 200x400 feet. The largest of the regular hotels is the Waldorf-Astoria, built on the site of the Astor family mansions along Fifth Avenue. Other fine uptown hotels are the Buckingham, the Holland House, the Murray Hill, the Manhattan, the Netherland and the Savoy. Farther downtown are the Fifth Avenue and other popular houses. The most celebrated restaurant is Delmonico's at 44th Street and Fifth Avenue. There are also many clubs which have luxurious homes, among the most noted being the Union League Club at Thirty-ninth Street, of the Century Association in West Forty-third Street and of the Player's Club in Gramercy Park.

Among the many fine theaters, the largest and most noted is the Metropolitan Opera House on Broadway. Other luxurious high-class theaters on Broadway are the Broadway, the Casino, the Criterion, the Knickerbocker, the Empire, the Garrick, and the Manhattan. Other important theaters are the American, the Garden, and the Irving Place, a high-class German theater. The Carnegie Music Hall at Fifty-seventh Street and Seventh Avenue is one of the finest concert halls in the world.

Parks and Monuments.—The oldest park in the city is Washington Square, laid out about 1840. In Washington Square stands the Washington Arch, completed in 1892. It is seventy feet high and was erected by popular subscription at a cost of $128,000. North of Washington Square is Union Square, and still farther north, Madison Square. Central Park, designed in 1857, is now one of the most beautiful and famous in the world. This Park covers 840 acres, much of which is wooded. It contains zoölogical and botanical gardens, tennis courts and baseball fields, and affords many other opportunities for amusement. There are a large number of statues in the Park, of which the equestrian statue of Simon Bolivar, the bronze statue of Burns, and Thomas Ball's heroic statue of Daniel Webster are among the most noted. Among other fine monuments in the city are the celebrated equestrian statue of General Sherman by St. Gaudens on the Plaza near the southeast entrance to the Park, French's memorial to Richard M. Hunt opposite the Lenox Library, St. Gaudens' statue of Farragut in Madison Square Park, and Bartholdi's bronze statue of Lafayette in Union Square. Next to Central Park, the most noted pleasure-ground of the city is Prospect Park in Brooklyn. At the Battery the Park Department has under its care a well-stocked aquarium in the old Castle Garden. Among the many cemeteries of the city, Calvary is most famous for its beauty.

Educational and Other Institutions.—New York has more than 500 free schools and spends more for public education than any other community in the world. Among the higher institutions of learning are Columbia University, the College of the City of New York, the New York University, the College of St. Francis Xavier, St. John's College, Manhattan College, Barnard College, Teacher's College, Union Theological Seminary and the College of Physicians and Surgeons. There are many other

professional schools and also numerous academies, schools of music and art and many literary, historical and scientific associations. The work of the educational institutions is supplemented by many fine libraries. The New York Public Library, formed by the consolidation of the Astor and Lenox libraries and the Tilden trust fund, has a shelving capacity for 1,250,000 volumes and now contains about 800,000 volumes. Connected with the Public Library are sixteen circulating libraries and reading rooms, and the Carnegie gift of $5,200,000 provides for the establishment of sixty branch libraries. The first of these was opened in 1903. Other excellent libraries are connected with the various universities and societies.

For many years New York has been the American art center and the Metropolitan Museum of Art contains the most important collections of pictures, statuary and archæological specimens in the country. The Lenox also has a fine collection of pictures. Other museums of interest are the American Museum of Natural History and the museums maintained by Columbia University and the Historical Society.

There are forty-eight daily newspapers published in the city. The oldest are the *Commercial Advertiser*, founded in 1797, and the *Evening Post*, founded in 1801. Other important papers are the *Sun*, the *Herald*, the *Tribune*, the *Times*, the *World*, the *Journal*, the *Press*, the *Daily News*, the *Telegram*, the *Mail and Express*, and the *Staats-Zeitung*.

Population.—The population of Greater New York in 1900 was 3,437,202. Besides this, the suburbs on the Jersey shore of the Hudson and the more remote New Jersey towns which are the homes of many New York business men, have a population of about half a million. The most densely populated district is the lower East Side. Here in 1900 was a population of 735.9 to an acre. Of this population 67.2 per cent were foreign born, mainly Jewish and Italian. Of the total population, 1,270,080 were foreign born. New York is our most cosmopolitan city. Almost every nationality is represented, but the Germans, Irish, Italians, Russians, Bohemians, Hungarians, Austrians, Poles and English are most in evidence.

Finance.—The budget of New York is greater than that of any other city in the world. In 1901 the actual income was $118,740,596. There is a bonded debt of $6,306,472 and a sinking fund against this debt of $121,340,920.

History.—The first white man known to have visited Manhattan Island was an Italian, Giovanni Verrazano, who, sailing in the French service, entered the harbor in 1524. He was followed by Gomez and others and by 1600 the French had established an extensive trade with the Indians along the Hudson. In September, 1609, Henry Hudson, in the service of the Dutch East India Company, explored the harbor and river and soon afterward the Dutch began trading with the Indians. But the first serious attempt at colonization began in 1623, when a band of thirty Dutch settlers arrived. Peter Minuit, the first director-general, came over in 1626 at the head of another company of colonists and, having bought Manhattan Island from the Indians for a consideration of $24, christened the town New Amsterdam. Under Minuit and his successors, Wouter Van Twiller, William Kieft and Peter Stuyvesant, the colony prospered and grew until in 1653 it numbered about 800 souls. In that year it was incorporated as a city. In 1664 Charles II granted New Netherlands to his brother the Duke of York and the English took posession of the city, renaming it New York. The Dutch regained the city in 1673, but again gave way to the English in 1674. In 1686 the first city charter was issued and in 1690 the first intercolonial congress was held in New York. Negro slavery had been introduced in 1625 and in 1712 a negro insurrection was put down with much cruelty; then in 1741 the discovery of a supposed conspiracy, "The Great Negro Plot," caused a panic which resulted in the arrest of 154 negroes, some of whom were burned, others hanged and others transported. The first printing-press in New York was set up in 1696, the first free school opened in 1703 and the first newspaper, the *Gazette*, founded in 1725. In 1732 a stage line was established between New York and Boston and in 1756 the Philadelphia stage began running.

In 1764 the Stamp Act Congress met in New York, and in 1770, nearly seven weeks before the Boston massacre, occurred a riot called the "Battle of the Golden Hill," which by some authorities is ranked as the first conflict of the American Revolution. In the early part of the summer of 1776 a large part of the American troops were quartered in the city. On July 8th the Declaration of Independence was publicly read to the soldiers and citizens, and next day the statue of George III on Bowling Green was torn down. In September the British occupied the city and held it from that time until "Evacuation Day," November 25, 1783.

From 1785 to 1790 Congress met in New York in the old City Hall, and here Washington was inaugurated in 1789. In 1785 the Bank of New York was established; in 1789 the Tammany Society was organized; from October, 1794, to July, 1795, and again in 1798 an epidemic of yellow fever raged in the city; in 1807 Fulton's steamboat, the *Clermont*, began making trips between New York and Albany; in 1812 a steam ferry to Long Island was opened; and in 1818 a line of Sound steamers was established, while in 1819 a steamship built in New York, the *Savannah*, crossed the Atlantic. The completion of the Erie Canal gave an impetus to the growth of the city, which since that time has increased its population at a rate never equaled by any other city. In 1832 and again in 1839 an epidemic of cholera visited the city; in 1835 occurred a great fire, causing much loss of life and a financial loss of almost $10,000,000; in 1837 a financial panic caused many failures and much destitution. From 1820 to 1870 riots were frequent in the city, the most serious being the Astor Place riot in 1849.

In 1853 the Crystal Palace Industrial Exhibition was opened and in 1857 occurred another severe financial panic.

During the Civil War the city as a whole loyally supported the Union, though many in the city seemed to favor the South. After the war, for several years the city suffered from political frauds perpetrated by the "Tweed Ring," but in 1871 the "Ring" was effectually broken up. Financial panics occurred in 1869 and in 1873, the latter being especially disastrous. The Brooklyn Bridge was opened to traffic in 1883, and in 1886 the Statue of Liberty in the Harbor was unveiled. During the last forty years, the material prosperity of the city and its territorial expansion have steadily increased. In 1890 a movement was set on foot to include Brooklyn and the suburban communities of New York within the city limits. Portions of this territory were annexed from time to time, and finally in May, 1897, an act was passed by the legislature creating the City of Greater New York, which includes the boroughs of Manhattan, Brooklyn, the Bronx, Queens and Richmond. The first charter of Greater New York went into effect Jan. 1, 1898, but the legislature of 1901 made radical changes in it.

New York, College of the City of, an educational institution supported by the city of New York. This institution was established by the Board of Education in 1847, under the name of the New York Free Academy, and combined the functions of a college and a polytechnic institution. It developed steadily, and in 1866 its name was changed to the College of the City of New York. Before 1882, the college was open only to graduates of New York public schools, but since that date any resident of New York City over fourteen years of age is eligible to be a student. There are five courses of study, leading to the degrees of A. B. and B. S. After two years of additional study the degrees of M. A. and M. S. may be conferred. The advantages for the study of English and for courses in manual training are especially fine. In 1904, the college had 118 instructors, 2,421 students and a library containing 35,749 volumes. The president is John Huston Finley.

New York University, an institution of higher learning in New York City, chartered in 1831. The University comprises the following departments: (1) University College; (2) the Law School; (3) the Medical College; (4) the School of Applied Sciences; (5) the School of Pedagogy; (6) the School of Commerce, Accounts and Finance; (7) the Graduate School; (8) the Summer School. In 1904, the University had 212 instructors, 2,101 students and a library containing 76,612 volumes. The main site of the University, on the heights overlooking the Hudson and the Harlem, is one of singular beauty. The finest building on the campus is the new Library, with the colonnade known as the Hall of Fame for Great Americans. In 1900, the first names were inscribed in the panels of the Hall of Fame as follows: George Washington, Abraham Lincoln, Daniel Webster, Benjamin Franklin, Ulysses S. Grant, John Marshall, Thomas Jefferson, Ralph Waldo Emerson, Robert Fulton, Henry Wadsworth Longfellow, Washington Irving, Jonathan Edwards, Samuel F. B. Morse, David G. Farragut, Henry Clay, George Peabody, Nathaniel Hawthorne, Peter Cooper, Eli Whitney, Robert E. Lee, Horace Mann, John J. Anderson, James Kent, Henry Ward Beecher, Joseph Story, John Adams, William E. Channing, Gilbert C. Stuart, Asa Gray. Every five years, until the 150 panels are filled, the University Senate will select five additional names to be added to the roll of famous Americans. The government of the University is vested in a Senate of which the head is a chancellor. The present chancellor is H. M. MacCracken.

New Zealand, a British colony in the South Pacific Ocean, about 1,000 miles southeast of Australia. It consists of two large islands, North Island and South (or Middle) Island, separated by Cook Strait; and a third small island, Stewart Island, about 25 miles south of South Island. The Auckland, Chatham and other small outlying groups are also attached to the colony. The total area of the colony is estimated at 104,471 square miles.

Surface.—The surface of North Island is characterized by low hills and tablelands, densely forested. But there are several volcanic peaks in the island, of which the highest is Ruapehu (9,715 feet), whose cone is now extinct. Tarawera and Tongariro are active volcanoes. There are a number of lakes of volcanic origin, of which the largest is Lake Taupo, with a diameter of 22 miles and an enormous depth. The region surrounding it is full of hot springs and geysers. The coast line is much indented, but as most of the bays are obstructed by bars, good harbors are few.

The surface of South Island is very different. It has no volcanoes and the coast line is regular. Along its western coast runs a lofty mountain range, known as the Southern Alps and rivaling the European Alps in their rugged beauty. The height ranges from 8,000 to over 12,000 feet. Forests cover the mountains to the snow line. On the western slope are great glaciers, while along the eastern slope extends a series of long mountain lakes, of which the largest and most beautiful is Lake Wakatipu.

Minerals, Climate, Natural Productions.—With mineral wealth New Zealand is liberally supplied. Coal is obtained in many parts, and copper has been worked on a small scale. Gold is worked both in North and South Island. It was first practically discovered in 1861, and is obtained in two forms, namely, as veins in quartz reefs, and as alluvial gold. Extending through 12° of latitude, and having a greatly diversified surface, New Zealand has necessarily a very varied though a remarkably healthy climate. In temperature it resembles France and North Italy, but the humidity is considerably greater. Rapid changes are a notable feature of the weather. Among vegetable productions the most characteristic are the ferns (130 different species), which form almost the only vegetation over immense districts. One of the most common is the *Pteris*

esculenta, the root of which is used as food by the natives and greedily devoured by pigs. Another remarkable plant of great economical value (even furnishing an article of export) is the flax plant (*Phormium tenax*). A number of the forest trees furnish valuable timber. Among others is the kauri or damar pine. The soil and climate of New Zealand, however, produce in perfection every English grain, grass, fruit, and vegetable. In the gardens of the warmer valleys fruits of a semi-tropical character—the pomegranate, citron, orange, and olive—might be raised. In animals New Zealand is singularly deficient, only a sort of dog (now extinct), a rat, and two species of bats being indigenous. Rabbits have been introduced and have multiplied so as to become a perfect pest; pigs now run wild as well as cats. Pheasants, partridges, quails, and red and fallow deer have also been successfully introduced. All the common European quadrupeds appear to be easily acclimatized. The native birds are remarkable neither for numbers nor for beauty of plumage. Pigeons and parrots are the most common. The apteryx, a peculiar bird so called from having no wings, is one of the most remarkable of the native birds. Among others are the huia or parson bird and the owl parrot. The gigantic moa is now extinct. The chief reptiles are a few lizards. The coast teems with fish, and seals are still numerous in some parts.

Aborigines.— The original natives of New Zealand, called Maoris, a people of Polynesian origin, are supposed to have emigrated from the Navigators' or the Sandwich Islands some centuries ago. Split up into numerous petty tribes, and wasting each other by internecine feuds, their numbers have been so reduced that they do not now much exceed 40,000, all of whom, with the exception of a few hundreds, are located in the North Island. By missionary efforts a great part of them have been converted to Christianity. They have acquired in many instances considerable property in stock, cultivated lands, etc., and in the neighborhood of the settlements they are adopting European dress and habits.

Government, Education, etc. — By the constitution the crown appoints the governor; but the legislative power is vested in the General Assembly, or parliament of two houses—a Legislative Council consisting of forty-five members appointed for a term of seven years; and a House of Representatives, which is made up of seventy-four members elected by the people every three years. Representatives of the Maoris are admitted into both houses, and the members are paid. The governor is aided and advised by a ministry comprising the chief officers of state who are members of the General Assembly. By the act passed by the assembly in 1875, which abolished the provincial system, the powers previously exercised by superintendents and provincial officers were delegated to county councils or vested in the governor. The civil and criminal laws are the same as those of England. For colonial defense a number of volunteers have been enrolled (about 17,000); the chief ports are also being put in a state of defense. There is no state-aided church, but most Christian sects are well provided for. The Church of England is most numerously represented. Elementary education is free, secular, and compulsory. Secondary education is provided for in numerous high schools, grammar schools, colleges, etc. At the head of the higher education is the University of New Zealand, an examining body empowered to grant honors, degrees, and scholarships. Affiliated to it are several colleges throughout the colony. There is also a separate university at Dunedin. There are four training colleges for teachers, theological colleges, etc.

Industry, Commerce, etc — Stock rearing and agriculture are the most important industries, though mining is also an important occupation. There are about 19,000,000 sheep in the colony, and by far the most important export is wool (over $20,000,000 annually), frozen meat and grain being also largely exported. Gold is the most valuable export next to wool, others are tallow, timber, kauri-gum. The imports naturally are chiefly manufactured goods, drapery, ironmongery, machinery, etc.; also tea, sugar, spirits, etc. There are upward of 2,300 mi. of government railway in New Zealand open for traffic; and about 7,250 miles of telegraph.

History.— New Zealand was first discovered by Tasman in 1642, but little was known of it till the visits of Cook in 1769 and 1774. The first permanent settlement was made by missionaries in 1815, but no regular authority was established by the British government till 1833, when a resident was appointed, with limited powers, and subordinate to the government of New South Wales. In 1840 New Zealand was erected into a colony; in 1841 it was formally separated from New South Wales and placed under its own independent governor; and in 1852 it received a constitution and responsible government. Troubles with the natives of the North Island about land have given rise to frequent Maori wars, and so late as 1886 a disturbance about land arose. In 1865 the seat of government was removed from Auckland to Wellington. In 1873 the Public Works Policy was inaugurated, and large loans were raised for immigration, harbors, railways, roads, etc. In 1876 the provinces were abolished; the colony was divided into 63 counties, and all government centralized at Wellington. The movement toward State socialism came to the front in 1890, and since that time the progress has been rapid until now the government controls all public utilities. Socialism, as practiced in New Zealand, has been so successful that it has given a strong impetus to the movement in older countries. In the South African War, New Zealand loyally supported Great Britain.

Ney (nā), Michel (1769–1815), duke of Elchingen, prince of the Moskwa, marshal and peer of France, was b. at Sarre-Louis, in the department of the Moselle. He entered the military service in 1788 as a private hussar, and rose by degrees to the rank of captain in 1794, adjutant general in 1796, general of division

in 1798, and as such he distinguished himself in the Rhine campaign. Appointed marshal of the empire by Napoleon in 1805, he achieved victory over the Austrians at Elchingen, and took part in the battle of Jena. During the Russian campaign he commanded the third division at the battle of the Moskwa, and conducted the rear guard in the disastrous retreat. In the campaign of 1813 his skill and courage decided the victory of Lützen, and assisted at Bautzen and Dresden. When Napoleon abdicated and the Bourbon dynasty was established, Ney took the oath of allegiance to the king and received a command; but when the emperor landed from Elba his old general joined him at Lyons and opened the way to Paris. When the allies entered Paris he escaped in disguise to the provinces, but was finally arrested, brought back to Paris, tried for treason, and executed.

Ngami, a South African lake to the north of the Kalahari Desert; length about 37 m., breadth about 15 m.

Niagara Falls, Niagara co., N. Y., on Niagara river, 20 m. n. of Buffalo, 13 m. s. of Lake Ontario. Railroads: the Erie, Lehigh Valley, Mich. Cent., and N. Y. C. & H. R. The city is formed by the consolidation of the villages, Niagara Falls and Suspension Bridge. The river is here crossed by three remarkable bridges. (See *Niagara.*) The locality has long been famous for the beauty of the great falls in the river, but never until recently has an attempt been made to utilize the enormous water power. The first practical step was the construction of a hydraulic canal, which draws the water from the river about a mile above the falls on the American side. The largest turbines in the world are here. They are set in a pit 178 ft. deep, 140 ft. long and 18 ft. wide. From the lower end of this pit, a tunnel about a mile and a quarter long was constructed, connecting with the river below the falls. The current operates machinery in Buffalo. The principal manufactures of Niagara Falls are paper pulp, flour, silver-plated ware, aluminum and machinery. Pop. 1900, 19,457.

Niag'ara, a river of North America, separating Ontario from the state of New York; and conveying the waters of Lake Erie into Lake Ontario. It is 33½ mi. long, and varies in breadth from 1 to 4 mi., being about the former where it issues from Lake Erie, near the city of Buffalo. It is occasionally interspersed with low wooded islands, the largest of which, Grand Island, has an area of 17,000 acres. The total descent in the river's course between the two lakes is 331 ft. About 15 mi. from Lake Erie a sudden narrowing and descent in the channel causes what are called the Rapids, below which the river, here divided by Goat Island, is precipitated over the celebrated Falls. The rush of the river is such that the water is shot a clear 40 yds. from the cliff, leaving a narrow pathway for a short distance below for the adventurous. The cataract on the south side of the island, called the American Fall, is 162 ft. high, width 1,125 ft.; that on the Canadian side, called the Great or Horseshoe Fall, is 149 ft. high and 2,100 ft. wide. Below the falls the river rushes with great velocity down the sloping bottom of a narrow chasm for the distance of 7 m. About 3 m. below the falls, a sudden turn of the channel causes the water to whirl in a vast circular basin. The first great railway bridge in America was the Great Suspension Bridge built over this river in 1854. In 1897, it was replaced by a steel-arch bridge. Two other bridges cross the river, a fine cantilever 910 ft. long, erected in 1882; and another of the steel-arch type, built in 1898. The latter has the longest arch in the world, its span being 840 feet.

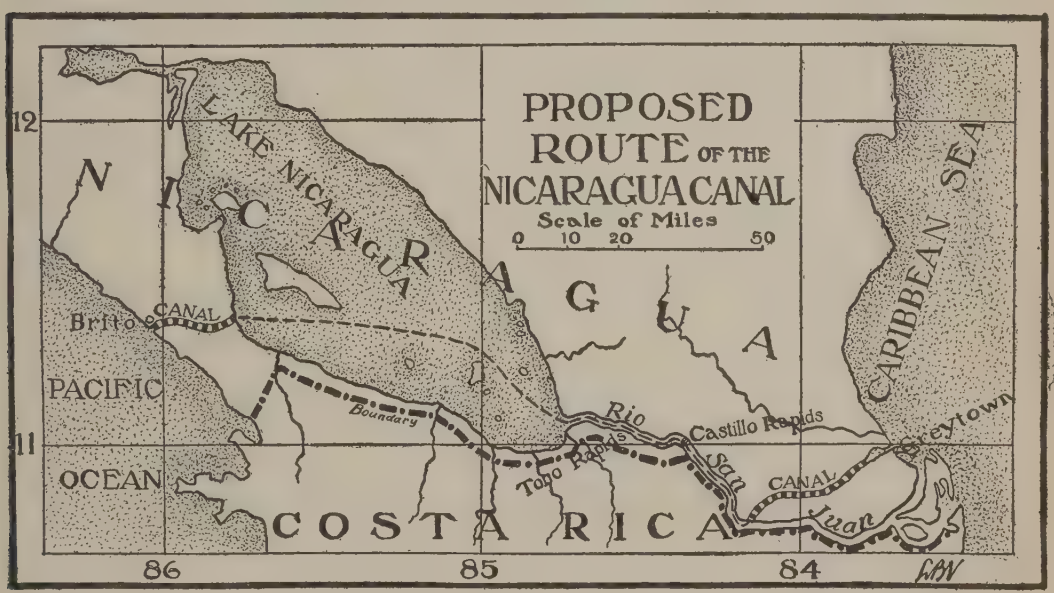
Nibelungenlied, the "Lay of the Nibelungs," one of the earliest national German epics, which in various forms has existed since the thirteenth century. It is of unknown authorship, and is rather a growth, or accretion, than a performance completed at any one period. It was originally founded upon the saga of Sigurd, in the *Elder Edda,* and additions were from time to time made until it became Homeric in volume. The main story is this: Siegfried, heir of the king of the Netherlands, having gained the storied treasure of the Nibelungs, bearing a curse for its owner, marries Kriemheld, sister of Gunther, king of Worms, whom he helps to win Brunhilde of Iceland, by substituting himself for Gunther. After a while occurs a bitter strife as to precedence between Gunther and Siegfried, and Brunhilde's jealousy is so aroused as to provoke her to engage Hogen, one of Gunther's vassals, to murder Siegfried. Kriemheld, after long mourning for Siegfried, at length marries Attila (Etzil), king of the Huns. After Siegfried's death she had gained the treasure of the Nibelungs; but Hogen succeeded in wresting it from her, and throwing it from him, it sank to the bottom of the Rhine. Years afterward Kriemheld thirsting for revenge, invites her brother and his court to visit her. They accept the invitation, accompanied by 11,000 retainers. As soon as the guests arrive Kriemheld seeks to assassinate them The Nibelungs planting themselves in the great halls, make a stern resistance, but the hall is set on fire, and finally the last Nibelung is slain except Hogen and King Gunther. These two are brought to the insatiate queen by Dietrich of Bern, who had hitherto not participated in the contest. She asks Hogen where he sank the treasure, and he tells her of his oath not to reveal the place. She orders her brother's head struck off and shows it to Hogen, who is now free to tell, as he alone survives. Kriemheld then slays him with the dead Siegfried's sword, and thereupon the aged warrior Hildebrand slays her in turn. The treasure, fatal to all who have ever held possession of it, is still supposed to lie at the bottom of the Rhine. There are numerous old MSS. of this famous poem, but the most valuable are three, called respectively the Munich, St. Gall, and Lassberg MSS., all dating from the thirteenth century.

Nicæ'a (Nice), an ancient city of Asia Minor, capital of Bithynia, about 45 mi. s.e. of Byzan-

dium. Under the Roman Empire it retained long an exalted rank among the eastern cities, and is renowned in ecclesiastical history for the famous council held here in the reign of Constantine (A.D. 325), in which the formula bearing the name of the Nicene Creed was drawn up. After the foundation of the Latin Empire in Constantinople in 1204 the Greek Emperor Theodorus Lascaris made Nicæa the capital of his empire, which it continued to be until in 1261 the Greek emperors recovered Constantinople. It was finally taken by the Turks in 1330.

Nicara'gua, a republic of Central America, extending from the Pacific Ocean to the Caribbean Sea, and having on the north and northeast the state of Honduras, and on the south Costa Rica; area about 51,660 sq. mi. The state is traversed by the Cordillera of Central America, between which and the Pacific coast there is a remarkable depression extending for 300 mi., and containing Lake Nicaragua (which see) and the smaller Lake Managua at no great elevation above the sea. Along the coast is a chain of volcanic cones, rising in some cases to 7,000 ft. From the Cordillera the surface slopes to the Caribbean coast (Mosquito Territory), which is low and swampy. Nicaragua has a considerable number of rivers, the chief flowing to the Caribbean Sea, as the Coco and the San Juan. Veins of silver, copper, and gold occur. The climate is on the whole healthy, the interior and mountainous parts being more dry and cool than on the coasts. The vegetable productions include indigo, sugar, coffee, cacao, cotton, maize, rice, etc. Fruits of various kinds are plentiful. One of the principal sources of wealth consists in cattle, of which there are great numbers, the high plains affording excellent pasturage. The capital is Managua. In 1821 Nicaragua joined Guatemala, Costa Rica, Honduras, and Salvador in revolting against Spain, and after a sanguinary civil war it achieved independence. It has been the scene of various revolutions and counter revolutions. The republic is governed by a president elected every four years, a senate and a house of representatives elected by universal suffrage. The principal exports are caoutchouc, coffee, hides, dye wood, and indigo. Corinto on the Pacific and San Juan del Norte or Greytown on the Caribbean Sea are the chief ports. Pop. 1901, including Indians, 420,000.

Nicaragua Canal, a canal projected across the Isthmus of Nicaragua to connect the Atlantic and Pacific oceans. As originally surveyed, this canal was to extend from Greytown on the Caribbean Sea to Brito on the Pacific. The length was 183.86 miles, of which 70.51 miles was to be through the San Juan River and Lake Nicaragua. The early history of this canal is given under *Panama Canal*, but there are a few events which apply particularly to the Nicaragua route. In 1849 a concession was granted a company headed by Cornelius Vanderbilt. In 1850 the Clayton-Bulwer treaty was ratified between the United States and Great Britain. This treaty stipulated that neither of the contracting parties should have exclusive control of an isthmian canal. Both nations violated minor provisions of the treaty from time to time, and during the administration of President Arthur the United States negotiated a treaty with Nicaragua providing for the construction and control by this government of an isthmian canal. This treaty had not been ratified in 1885 when President Cleveland came into power, and was withdrawn. In 1889 the Maritime Canal Company was organized, and two years later congress provided for a commission to investigate the canal route and estimate the cost of construction. This commission was followed in 1899 by the Walker commission, whose report



in favor of the Nicaragua route aroused general interest in the enterprise, and it seemed very probable that the canal would be constructed according to this recommendation. However, in 1902, before negotiations with Nicaragua were completed, the Panama Canal Company offered to sell their franchises and property to the United States for the valuation placed upon them by the canal commission. This offer was accepted. See *Panama Canal.*

Nicaragua (Lake of), an extensive sheet of water in Central America, in the state of same name, 90 mi. long n.w. to s.e.; greatest breadth 40 mi.; mean 30 mi.; 110 ft. above the Pacific, from which it is separated by a strip of land 12 mi. wide. The river San Juan de Nicaragua flows from its southeastern extremity into the Caribbean Sea; and at its northwestern extremity it is connected with the smaller Lake of Managua or Leon by the river Penaloya. Steamers now ply upon it, as it forms a link in the traffic route across the isthmus of Central America.

Nice (nēs) (Italian, *Nizza;* ancient, *Nicæa*), a city and seaport of France on the Mediterranean, capital of the department of Alpes Maritimes, beautifully situated near the base of the Maritime Alps. Nice is much resorted to as a health resort during winter. The climate is mild, the mean temperature being 60° F.; but the changes of wind are sudden, especially in spring. Nice possesses silk, cotton, and paper mills, oil mills, etc. The exports consist principally of oil, wine, and silk, with essences, perfumes, etc. Nice belonged to Italy previous to 1860. Pop. 77,478.

Nice, Councils of, ecclesiastical councils held at Nice or Nicæa, in Asia Minor, in 325 and 787. The object of the first Council of Nice, which was convened by Constantine, was to settle the controversies which had arisen in regard to the doctrine of the Trinity. The session lasted about two months. A creed was adopted by the council in its later form known as the Nicene Creed (which see). The council of 787 was summoned by the Empress Irene, with the concurrence of the pope, and decreed that images were to be used as aids to devotion.

Nicene Creed, a summary of the chief tenets of Christian faith adopted by the Council of Nice in 325 A. D. It is, next to the Apostles', the oldest of creeds, and is acknowledged to the present day, not only by the Roman Catholic and Greek churches but by most Protestant churches as well. It is founded upon the baptismal creed of the church of Caesarea in Palestine, its essence being the expression of the belief that "Christ is of the *same* substance with the Father."

Nicholas I (Nikolai Pavlovich) (1796–1855), emperor of Russia, third son of the Emperor Paul I. He ascended the throne in 1825. He made war with Persia in 1827–28; joined in the Treaty of London, which secured the independence of Greece; and made one of the allied powers who destroyed the Turkish fleet at Navarino in 1827. This affair led to war between Russia and Turkey, in which the latter was defeated, paid indemnity, and signed the treaty of peace at Adrianople in 1829. He suppressed the Polish insurrection which broke out in the following year with relentless severity. In 1848 Nicholas assisted Austria with an army corps in putting down the rising in Hungary. Early in 1852 began the Russian effort to take over the holy places and assume the protectorate of the Christians in Palestine. This led to the Crimean War, before the close of which Nicholas died from lung disease.

Nicholas II (1868——), Czar of Russia and son of Alexander III; b. May 18, 1868. He was carefully educated and entered the army at the age of eighteen. In 1890 and 1891 he travelled in the East, visiting Egypt, India, China, and Japan. On the death of his father, in 1894, he succeeded to the throne. His formal coronation took place with great ceremony at Moscow in the summer of 1896. He married Princess Alix of Hesse-Darmstadt. Pl. 12, Vol. II.

Nickel, a metal of a white color, of great hardness, very difficult to be purified, always magnetic, and when perfectly pure malleable and ductile. It unites in alloys with gold, copper, tin, and arsenic, which metals it renders brittle. With silver and iron its alloys are ductile. Nickel is found in all meteoric stones, but its principal ore is a copper colored mineral found in Germany. Nickel has become an object of considerable importance, and is extracted from several pyrites, compounds of nickel, cobalt, antimony, arsenic, sulphur, or iron. The salts of nickel are mostly of a grass-green color, and the ammoniacal solution of its oxide is deep blue. Nickel mixed with brass in varying proportions is now well known and largely used as German silver or nickel silver. Another important use of the metal is for coating articles by the electroplate process. See *Nickel Plating.*

Nic'otine, a volatile alkaloid base obtained from tobacco. It forms a colorless, clear, oily liquid, which has a strong odor of tobacco. It is highly poisonous, and combines with acids, forming acrid and pungent salts.

Niebelungenlied. See *Nibelungenlied.*

Niebuhr (nē'bör), Barthold Georg (1776–1831), a noted German historian. He studied law at Göttingen, and philosophy at the University of Kiel; became, in 1796, private secretary to the Danish minister of finance, and soon after under-librarian in the royal library of Copenhagen. Having been appointed historiographer-royal he delivered lectures on Roman history in the University of Berlin, and in 1811 published them in two volumes. In 1816 he was appointed Prussian minister to the papal court at Rome, and there he resided until 1822, chiefly occupied in historical research. At the latter date he returned to Bonn and became adjunct professor of ancient history at the university. Here he continued his *Roman History,* the third volume of which appeared after his death. He also superintended the *Corpus Scriptorum Byzantinorum,* and published various archæological and philological treatises. His *Roman History* covered

only the period down to the First Punic War, but introduced quite a new era in the study of Roman antiquity.

Niel (ni-el), ADOLPHE (1802–1869), French marshal. He was educated at the Ecole Polytechnique, Paris, and the Military School, Metz; took part in the expedition against Constantine in Algeria; assisted as head of the staff of engineers at the siege of Rome in 1849 during the revolutionary movement under Garibaldi; commanded the engineers and planned the operations against Sebastopol in 1854–55; distinguished himself in the Italian campaign of 1859; and was thereafter made a marshal of France by Napoleon III.

Niel'lo, a method of ornamenting metal plates, much practised in the Middle Ages, and which gave rise to copper-plate engraving. The lines of a design were cut in the metal, and filled up with a black or colored composition, which gave effect to the intaglio drawing.

Niemen (nyā'men) (or Memel), a river in Russia, runs generally northwest and falls into the Kurisches Haff. It is 640 mi. in length, and is navigable as far as Grodno, 400 mi.

Niflheim, in Scandinavian mythology, the region of endless cold and everlasting night, ruled over by Hela.

Niger, the name of a great river of Western Africa, which rises on the north side of the Kong Mountains, flows north and northeast, afterward turns southeast and south until, by various channels, it enters the Gulf of Guinea, its total length being about 2,600 mi. Throughout its course the river is known under various names, such as Joliba, Kworra (Quorra), Mayo, etc. Not much is known of the river until it reaches Sego, about 340 mi. from its source; but here it enters upon a fertile tract of country which continues until Timbuctoo is reached. Large islands divide the river channel, and its tendency here is to spread over the flat country in a network of small streams. At the town of Burrum, where it trends in a curve to the southeast, the river is known as the Mayo until it reaches its confluence with the Benué, where it becomes known as the Kworra. At Aboh, about 100 mi. from the sea, the great delta of the Niger begins. This delta extends along the coast for about 150 mi., and is intersected by a network of channels and islands, the principal navigable courses being the Nun, Bonny, and Mari. Mungo Park was the first European who explored this river (1796–97).

Niger Protectorate, an extensive region of Western Africa under British protection, comprising the Niger delta, and a tract on both sides of the river more than 1,000 mi. from its mouth, as well as the valley of the Benué for a long distance. A great part of this tract is under the administration of the Royal Niger Company, a British company chartered in 1886, which maintains a police force and a small body of native soldiers to keep order. The company has a large number of stations, and its territories are divided into provinces, each under a separate officer, and all under the agent-general.

Night Blindness, the medical term being *hemeralopia*, is a disease in which the eyes enjoy the faculty of seeing while the sun is above the horizon, but are incapable of seeing by the aid of artificial light.

Night Hawk, a species of goat-sucker, a bird universally known in the U. S., 9½ in. in length and 23 in extent of wing. It is a bird of strong and vigorous flight, and its prey consists of beetles and other large insects. The other American species are the "chuck-will's widow" and the "whip-poor-will," both of which, like the night hawk, arrive in May, and leave in September.

Night Heron, a wading bird of several species belonging to the family Ardeidæ (herons and cranes). The species occur in Europe, Asia, Africa, and America. The common night heron is about 20 in. in length, and has three long, narrow feathers proceeding from the nape of the neck, and hanging backward.

Nightingale, a well-known passerine bird of the thrush family. The nightingale sings at night, and its famed chant is the love-song of the male, which ceases when the female has hatched her brood. It is a native of many parts of Europe and Asia, and of the north of Africa. It is migratory, extending its summer migrations as far north as the south of Sweden. In England, where it appears about the middle of April, it is rather a local bird, some parts appearing to be quite unsuited to its habits; the northern counties are seldom visited, and in Scotland and Ireland it is unknown. It feeds on caterpillars and other larvæ, frequents hedges and thickets, and builds its nest on the ground or near it, laying four or five eggs of a blue color. The young are hatched in June, and are prepared to accompany their parents in their southward migration in August. It is solitary in its habits, and its coloring is very inconspicuous. Another species inhabits Southeastern Europe.

Common Nightingale.

Nightingale, FLORENCE, b. 1829, a famous nurse, daughter of Wm. Shore Nightingale, Embly Park, Hampshire, England. At an early age she manifested a keen interest in suffering humanity, and from philanthropic motives she visited the chief military hospitals in Europe, and studied the chief nursing systems. During the Crimean War (1854) the hospital accommodation was found to be very

defective, and Miss Nightingale promptly volunteered to organize a select band of nurses at Scutari. The offer was accepted by the War Office, and within a week Miss Nightingale was on her way to the East, where she rendered invaluable service to tne sick and wounded by her incessant labors in nursing and hospital reform. The strain, both mental and physical, which this work demanded, permanently injured her health; yet notwithstanding her confinement to a sick room, she has continued to give her experience in the interest of hospital reform, and for this purpose she was consulted during the Civil War and the Franco-German War. She has also published *Notes on Hospitals*, *Notes on Nursing*, *On the Sanitary State of the Army in India*, *Notes on Lying-in Institutions*, and *Life or Death in India* Pl. 3, Vol. I.

Nightmare, a state of oppression or feeling of suffocation which sometimes comes on during sleep, and is accompanied by a feeling of intense anxiety, fear, or horror, the sufferer feeling an enormous weight on his breast, and imagining that he is pursued by a phantom, monster, or wild beast, or threatened by some other danger from which he can make no exertion to escape. The sufferer wakens after a short time in a state of great terror, the body often covered with sweat. The proximate cause of nightmare is said to be irregularity of the circulation in the chest or brain, and the disorder is generally due to repletion and indigestion, but sometimes to the fact of the sufferer lying in an awkward position in bed.

Nightshade, the English name of various species of plants, chiefly of the genus *Solānum* (to which the potato belongs). The woody nightshade or bittersweet, and common or garden nightshade, are British plants, the first growing in hedges and among bushes, and the latter in gardens, fields, and waste places. The root and leaves of *S. Dulcamāra* are narcotic, and have been applied to various medicinal uses. The berries, if not absolutely poisonous, are suspicious. *S. nigrum* is fetid and narcotic, and has also been employed medicinally. *Deadly nightshade* is *Atrŏpa Belladonna.* See *Belladonna.* For *enchanter's nightshade* see that article.

Black Nightshade.

Nigritia. See *Soudan.*

Ni'hilists, the name at first applied specifically to the revolutionary party in Russia who accepted the destructively negative philosophy of Bakunin and Herzen, but now applied indiscriminately to Russian revolutionists. This name was given to the party by Tourgenieff in his stories of Russian society, and accepted by them as descriptive of their character. Their object was to destroy all forms of government, overturn all institutions, annihilate all class distinctions, sweep away all traditions. They left to future generations the task of constructing society out of the ruins left by their relentless, destructive policy. For some years this propaganda was spread in printed and oral forms among the newly enfranchised serfs by thousands of young people of both sexes. About 1874, however, the Russian government began to interfere, the newspapers which advocated the Nihilist doctrine were suppressed, foreign pamphlets seized, and large groups of the revolutionists summarily tried and condemned to death and exile. Hitherto the Nihilists had spread their principles by peaceful means, but after the trial in 1877, in which ninety-nine persons were sent to Siberia, a secret and sanguinary struggle between armed assassins and the government began. The first startling indication of the new departure was the murder of General Trepoff by a young woman named Vera Sassulitch, and this was followed by the assassination of Generals Mezentzoff and Drenteln, Prince Krapotkin, and Commander Heyking. The incendiary followed the assassin. In June, 1879, no fewer than 3,500 fires broke out in St. Petersburg and other large towns, most of which were attributed to the Nihilists. Various attempts were made to assassinate the emperor. Four shots were fired at him by Solovieff; a train in which he was supposed to travel was wrecked by Hartmann, an apartment in the Winter Palace at St. Petersburg was blown up, and at last, in March, 1881, Alexander II was murdered by a bomb thrown beneath his carriage in the street near the palace. This terrible act seemed to exhaust the fury of the Nihilists. Lately, however, there has been a renewal of activity, but it finds expression in spreading socialism among the workmen of the towns. and is not strictly Nihilism.

Niigata (nē-i-gä'tà), the chief town of the province of Echigo, Japan, situated on the west coast of the island of Hondo, and on the left bank of the Shinano. This port was opened to foreign trade by the treaty of 1860; but the obstructed state of the river, the open anchorage, and the severe winter has hitherto prevented the development of much trade. The town is well built, the streets are traversed by canals, there is a hospital and a college, and considerable coasting trade. Pop. 47,019.

Nijmegen (Nymegen or Nimeguen), (nī'mā-gen, nim'e-gen), a city in the Dutch province of Gelderland, delightfully situated on the slopes of several hills, reaching down to the Waal. It has a fine old church (St. Stephen's), and a Renaissance townhall of the sixteenth century. The industrial occupations include

tanning, brewing, metal goods, cotton manufactures, etc. The town is celebrated for the treaty of peace concluded in 1678, between France and Holland, and Spain, and for that of 1679, between the German Empire, France, and Sweden. It was formerly a strong fortress, but the fortifications have been recently abolished. Pop. 32,990.

Nijni-Nov'gorod (nizh'nē), a town in Russia, capital of the government of same name, at the confluence of the Oka and Volga, 255 mi. e. of Moscow. The town forms three parts—the upper district, including the citadel; the lower portion, called the Nijni Bazaar, and the suburb, occupied by the great annual fair, and containing 6,500 booths, besides other structures for its accommodation. This fair, begun in 1816, is held annually between July 15 and September 1, O. S. Here there are gathered together an immense multitude of people from all parts of Russia, and many parts of Asia, and the annual value of the merchandise sold is estimated at about $150,000,000. The chief products sold are cotton, woolen, and linen goods, tea, silk and silk goods, metal wares, furs, leather, porcelain, earthenware, and glass, coffee, wine. Pop. 66,716. The province has an area of 19,704, sq. mi. The surface forms an extensive plain, occasionally broken and diversified by low, undulating hills. It is drained by the Volga. The soil is poor, and the crops, chiefly hemp and flax, not very abundant. A large part is covered with forests. Pop. 1,482,471.

Nijni-Tagilsk (nizh-nē-tà-gilsk'), a town of Russia amid the Ural Mountains, in the government of Perm, and 150 mi. e. of the town of Perm, in the midst of a district very rich in minerals. Pop. about 30,000.

Ni'kē, in Greek mythology, the goddess of victory. She was rewarded by Zeus with the permission to live in Olympus, for the readiness with which she came to his assistance in the war with the Titans. There is a temple to her on the Acropolis of Athens still in excellent preservation.

Nile, a great historic river in Africa, the main stream of which, known as the *Bahr-el-Abiad*, or White Nile, has its chief source in the equatorial lake Victoria Nyanza. What is known as the *Bahr-el-Azrek*, or Blue Nile, a much smaller stream, joins the White Nile at Khartoom, lat. 15° 40′ n. The source of the Blue Nile was discovered in the Abyssinian highlands by Bruce in 1770, while the source of the other, or true Nile, was for long the subject of speculation and exploration. The discoveries, however, of Speke and Grant in 1861–62, and of Sir Samuel Baker in 1863–64, and subsequent explorers, have established the fact that the headwaters of the Nile are collected by a great lake situated on the equater, called Ukerewe or Victoria Nyanza. The Nile, near where it flows out of Lake Victoria, forms the unimportant Ripon Falls, then flows generally northwest; about lat. 1° 40′n. it expands into Lake Ibrahim Pasha, afterward forms the Falls of Karuma and the Murchison Falls, and then enters another lake, the Albert Nyanza, at an elevation of about 2,550 ft. This lake, as has been recently discovered by Stanley, receives the waters of another lake further to the southwest, Lake Muta Nzige or Albert Edward, the channel of communication being the river Semliki. From the Albert Nyanza to the Mediterranean the general course of the Nile is in a northerly direction, with numerous windings. Above Gondokoro, the river forms a series of cataracts; but between these falls and the Albert Nyanza, a distance of 164 mi., the river is broad, deep, and navigable. Not far below Gondokoro the Nile begins to flow more to the west till it reaches lat. 9° n., where it receives the Bahr-el-Ghazal, one of its chief tributaries. On receiving this affluent it turns due east for about 100 mi., and then after receiving the Sobat from the southeast flows almost due north to Khartoom. It receives its last tributary, the Atbara, from the Abyssinian frontier, for the rest of its course (some 1,500 mi.) being fed by no contributary stream. Between this point and the frontiers of Egypt occur several rapids or cataracts presenting greater or less obstacles to navigation, there being also another cataract some distance below Khartoom. In Egypt, at the head of the Delta near Cairo, it divides into two main branches, leading down respectively to Rosetta and Damietta, where they enter the Mediterranean. As rain scarcely ever falls in the greater part of the valley of the Nile the river owes its supplies to the copious rains and the vast lake areas of the tropical regions in which it takes its rise, and its volume thus depends upon the season. It begins to increase in June, attains its greatest height about September, and then subsides as gradually as it rose. The ordinary rise at Cairo is about forty feet. During the flood a great portion of the Delta, and of the valley of Egypt higher up, is inundated. This annual inundation, with all the bounty which it brings, is watched and waited eagerly, and no doubt it was from this character of benefactor that the Nile has been worshiped as a god alike by Egyptians, Greeks, and Romans. Its length is est. at nearly 4,200 mi., or rather less than that of the Mississippi-Missouri.

Nile, BATTLE OF THE. See *Aboukier*.

Nilom'eter, an instrument for measuring the rise of water in the Nile during its periodical floods. The nilometer in the island of Rhoda (Er-Ródah), opposite to Cairo, consists of a slender graduated pillar standing in a well which communicates with the river. The pillar is divided into 24 cubits, each of which measures 21.4 in. When the inundation reaches the height of 21 cubits, it is considered adequate.

Nilsson, CHRISTINE (1843–), b. at Hassaby, near Wexiö, in Sweden. Accompanied by her brother she used to sing at village fairs and places of public resort, where she also played on the violin. In 1857 her talent attracted the attention of a wealthy gentleman, who had her educated as a singer at Stockholm, and afterward at Paris. In 1864 she made her first appearance as Violetta in *La Traviata*, at the

Théâtre Lyrique, Paris, and she appeared in 1867 for the first time at Her Majesty's Theater, London. On several occasions she has visited America with the utmost success. Among her most famous impersonations are Ophelia in Thomas's *Hamlet*, and Margaret in Gounod's *Faust*. In 1872 she married M. Auguste Rouzaud, who d. in 1882; in 1886 she married Count A. de Miranda.

Nimbus, a term applied in art, especially in sacred art, to a kind of halo or disk surrounding the head in representations of divine or sacred personages; as also to a disk or circle sometimes depicted round the heads of emperors and other great men. The nimbus in representations of God the Father is of a triangular form, with rays diverging from it all round, or in a very common form, the nimbus in representations of Christ contains a cross more or less enriched, that of the Virgin Mary consists of a circlet of small stars, and that of angels and saints in a circle of small rays. When the nimbus is depicted of a square form it indicates that the person was alive at the time of delineation. Nimbus is frequently confounded with *aureola* and *glory*.

Nimes (or Nismes) (nēm), a city of Southern France, capital of the department of Gard, 62 mi. n.w. of Marseilles. Its manufactures are chiefly of silk and cotton goods; it has a considerable commerce, and is the great entrepôt of Southern France for raw silk. Nîmes (anc. *Nemausus*), is supposed to have been built by a Greek colony, and was afterward for about 500 years in the possession of the Romans. In the sixteenth century it became a stronghold of Calvinism, and suffered much during the civil wars, as also by the revocation of the Edict of Nantes, and during the revolution; but latterly it is a busy manufacturing center. Pop. 71,-623.

Nimrod, described in Gen. 10: 8 to 12 as a descendant of Ham, a son of Cush, a mighty hunter before the Lord, and the beginning of whose kingdom was Babel, Erech, Accad, and Calneh in the land of Shinar.

Nimrud, the name given to the site of an ancient Assyrian city situated in the angle formed by the rivers Tigris and Zab, and about 18 mi. below Mosul. It is one of the group of great cities which clustered round Nineveh, the capital, and it has been supposed, from inscriptions found in the ruins, that it is identical with the Calah mentioned in Genesis 10.

Nin'eveh, an ancient ruined city, formerly capital of the Assyrian Empire, in Asiatic Turkey, and in the pashalic of Mosul, on the left bank of the Tigris, along which, and opposite to the town of Mosul, it occupied an extended site. It remained the capital of Assyria till about 606 B.C., when it was taken and burned by the Babylonian Nabopolassar and the Median Cyaxares. It was maintained as a local tradition that this ancient capital of Assyria lay buried on the left bank of the Tigris opposite Mosul; but the fact was not definitely settled until in 1841 M. Botta began excavations in the vast mounds which there existed. He was followed in this by Mr. (afterward Sir Henry) Layard, who explored a great portion of the large angle formed by the Tigris and the Zab. In the mounds of Koyunjik opposite Mosul he excavated the palaces of Sennacherib, Assurbanipal, and Esarhaddon. The walls of the city, which the inscriptions describe as Ninua, stretch along the Tigris for 2½ mi. and the elaborate outworks, moats and defenses can still be traced. The important discoveries made by Layard were continued by Loftus, Hormuzd Rassam, and G. Smith, and the result of their labors deposited in the British Museum.

Ning-po, a large city of China, in the province of Che-kiang, one of the ports open to foreign commerce, on a plain on the left bank of the Takia or Ning-po River, about 16 mi. from its mouth. It is surrounded by a wall 25 ft. high, 15 ft. wide, and 5 mi. in circuit, and its most remarkable edifice is the great Ning-po pagoda, 160 ft. in height, and now partly in ruins. The manufactures consist chiefly of silk and cotton goods, carpets, furniture, etc. The principal exports are tea, silk, and raw cotton; and the principal imports, sugar and opium. Pop. 240,000.

Ninus, the fabulous founder of the Assyrian Empire, and of its capital Nineveh. He married Semiramis, by whom he was afterward murdered.

Ni'obē, in Greek mythology, the daughter of Tantalus, married to Amphion, king of Thebes. Proud of her numerous progeny, she provoked the anger of Apollo and Artemis (Diana), by boasting over their mother Leto (Latona), who had no other children but those two. She was punished by having all her children put to death by those two deities. She herself was metamorphosed by Zeus (Jupiter) into a stone which shed tears during the summer. This fable has afforded a subject for art, and has given rise to the beautiful group in the tribune at Florence, known by the name of *Niobē and her Children*.

Nio'bium (or Columbium), a rare metal discovered in 1801 in a black mineral called columbite from North America. It forms a black powder insoluble in nitric acid, but readily soluble in a mixture of nitric and hydrofluoric acids.

Nipa, a genus of palms of which there is but one species, a native of the East Indies, Philippines, etc., growing on marshy coasts. It has no stem, fronds about 20 ft. long, and edible fruits. The fronds are used for a variety of purposes.

Niphon, (or Nipon). See *Japan*.

Nip'igon (or Nep'igon), a lake of Canada, in Ontario, about 30 mi. n.w. of Lake Superior. It is about 70 mi. long and 40 mi. broad, with rugged headlands, deep bays, and many islands. It is connected with Lake Superior by the Nipigon River.

Napis'sing, LAKE, a lake of Canada, in Ontario, northeast of Lake Huron, irregular in coast line; breadth about 30 mi.; length 48 mi. It contains numerous islands, and finds its only outlet by French River into Lake Huron.

Nipplewort, a plant of the genus *Lapsăna* (*L. communis*), nat. order Compositæ, growing commonly as a weed by the sides of ditches and in waste places.

Nirva'na. See *Buddhism.*

Nisâmi, (full name Aru Mohammed Ben Jusuf Sheikh Nisâm-ed-Dîn), one of the great poets of Persia, and the founder of the romantic epic, b. about 1100 A. D., was a special favorite of the Seljuk princes, who then ruled in Persia, d. in 1180. Besides a *Divan*, or collection of lyrics, he wrote five larger poems, which have been extensively circulated in Persia and India.

Ni'san, a month of the Jewish calendar, the first month of the sacred year and seventh of the civil year, answering nearly to our March. It was originally called Abib, but began to be called Nisan after the captivity.

Nisi prius, a law phrase meaning "unless before," and occurring originally in a writ by which the sheriff of a county was commanded to bring the men impaneled as jurors in a civil action to the court at Westminster on a certain day, "unless before" that day the justices came thither (that is, to the county in question) to hold the assizes, which they were always sure to do. The judges, by virtue of their commission of *nisi prius*, try the civil causes thus appointed in their several circuits, being said to sit at *nisi prius*, and the courts in which these actions are tried being called courts of *nisi prius* or *nisi prius* courts. A trial at *nisi prius* may be defined in general as a trial, before a judge and jury, of a civil action which has been brought in one of the superior courts.

Nitrate, a salt of nitric acid. The nitrates are generally soluble in water, and easily decomposed by heat. Deposits of nitrates are present in small quantities in almost all soils, but enormous accumulations exist in Chile and Peru. These latter deposits which are known as Chile saltpeter, cubic niter, or nitrate of soda, are found near the coast, and are probably produced from remains of marine animals and birds. The great value of this nitrate is in its application to agriculture as a fertilizer on impoverished soil; for it is now well known that crops require large quantities of nitrogen to secure their full development. The nitrates, of which nitrate of soda is now considered the best, should not be used on light porous soils where the rain will sink the manure below the range of the roots. They make an excellent top dressing in the spring.

Nitrate of Silver, a substance obtained by cooling, in the shape of tabular crystals, from the solution produced when silver is oxidized and dissolved by nitric acid diluted with two or three times its weight of water. When fused the nitrate is of a black color, and it may be cast into small sticks in a mold; these sticks form the *lunar caustic* employed by surgeons as a cautery. It is sometimes employed for giving a black color to the hair, and is the basis of the indelible ink for marking linen. Its solution is always kept in the laboratory as a test for chlorine and hydrochloric acid.

Nitrate of Soda, a salt analogous in its chemical properties to nitrate of potash or niter. It is largely used as a manure, and as a source of nitric acid and niter.

Niter, a salt, called also saltpeter, and in the nomenclature of chemistry nitrate of potassium or potassic nitrate. It is produced by the action of microbes in soils containing potash and nitrogenous organic matters, and forms an efflorescence upon the surface in several parts of the world, and especially in the East Indies, whence much niter is derived. In some parts of Europe it is prepared artificially from a mixture of common mold or porous calcareous earth with animal and vegetable remains containing nitrogen. It is also manufactured on a large scale by crystallization from a hot solution of chloride of potassium and nitrate of soda. It is a colorless salt with a saline taste, and crystallizes in six-sided prisms. It is employed in chemistry as an oxidizing agent and in the formation of nitric acid. Its chief use in the arts is in the making of gunpowder. It also enters into the composition of fluxes, and is extensively employed in metallurgy; it is used in the art of dyeing, and is much employed in the preservation of meat and animal matters in general. In medicine it is prescribed as cooling, febrifuge, and diuretic.

Nitric Acid, the most important of the five compounds formed by oxygen with nitrogen. When pure it is a colorless liquid, very strong and disagreeable to the smell, and so acrid that it cannot be safely tasted without being much diluted. It is known in the arts as *aqua fortis*, and is commonly obtained by distilling niter (potassium nitrate) or Chile saltpeter (sodium nitrate) with strong sulphuric acid. Nitric acid contains about 76 per cent. of oxygen, a great part of which it readily gives up to other substances, acting thus as a powerful oxidizer. Thus many metals, such as copper, tin, silver, etc., when brought into contact with this acid are oxidized at the expense of the acid with the production of lower oxides of nitrogen and an oxygenated metallic salt. Nitric acid, when moderately dilute, acts on organic bodies so as to produce a series of most useful substances, notably acetic, oxalic, and picric acids, isatin or white indigo, etc. By replacement of the hydrogen in nitric acid a series of salts termed *nitrates* is obtained. When nitrates are heated with combustible bodies an explosion is generally produced. A mixture of strong hydrochloric and nitric acids is known as *aqua regia*, *nitromuriatic*, or *nitrohydrochloric acid.* Nitric acid is employed in etching on steel or copper; as a solvent of tin to form with that metal a mordant for some of the finest dyes; in metallurgy and assaying; also in medicine, in a diluted state, as a tonic and as a substitute for mercurial preparations in syphilis and affections of the liver; and also in form of vapor to destroy contagion.

Nitrides, a general designation for the compounds of nitrogen with other elements or radicles, but more especially for those compounds which nitrogen forms with phosphorus, boron, silicon, and the metals.

Nitro-benzol, a liquid prepared by adding benzol drop by drop to fuming nitric acid. It closely resembles oil of bitter almonds in flavor, and is largely employed as a substitute for that oil in the manufacture of confectionery and in the preparation of perfumery. It is important as a source of aniline.

Nitrogen, an important elementary principle, the basis of nitric acid and the principal ingredient of atmospheric air. Its symbol is N, its equivalent 14, and its specific gravity 0.9713. It is a colorless, invisible gas, called by Lavoisier *azote* (Greek, *a*, privative, *zōē*, life), because it is incapable of supporting life. The name nitrogen was applied to it by Chaptal, because of its entering into the composition of niter, nitric acid, etc. The atmosphere contains about four fifths of its volume of nitrogen, the rest being principally oxygen; niter contains nearly 13 per cent., and nitric acid about 22 per cent. by weight of this substance. Nitrogen is inodorous, tasteless, incombustible, and a very inert substance in itself, although many of its compounds, such as nitric acid and ammonia, are possessed of great chemical activity. By reason of its inertness and general slowness of chemical action it acts the part of a diluent of oxygen in the atmosphere. Having no marked action of its own on living beings, its admixture with the oxygen of the air serves to moderate the otherwise too violent action of the latter gas. Under certain circumstances nitrogen may be induced to combine with other elements, especially with hydrogen, oxygen, and carbon, with titanium, tantalum, and tungsten. The oxides of nitrogen are five in number. These oxides may be all produced from nitric acid. The *trioxide* forms a dark-blue liquid, which, when added to water at 0°, combines therewith, forming *nitrous acid,* HNO_2. This solution acts as a reducing agent, inasmuch as it eliminates gold and mercury as metals from several of their salts; on the other hand, it also exercises an oxidizing action on such salts as ferrous sulphate, potassium iodide, etc. By replacement of the hydrogen in nitrous acid a series of metallic salts is obtained, called *nitrites.* Nitrogen monoxide or nitrous oxide is better known by the name of "laughing gas," from the peculiarly exhilarating effect which it produces when breathed along with a little air. If the gas be pure, its inspiration soon brings about a total insensibility, which does not continue long, and generally produces no bad effects upon the person who breathes it; hence it is much used as an anæsthetic in minor surgical operations, such as teeth drawing, etc.

Nitroglycerine, an explosive substance appearing as a colorless or yellowish oily liquid, heavier than and insoluble in water, but dissolved by alcohol, ether, etc. It is prepared by adding glycerine to a cooled mixture of sulphuric acid and fuming nitric acid. The liquid is poured in ten or twenty times its bulk of cold water, when the heavy nitroglycerine sinks to the bottom. When violently struck nitroglycerine explodes, being resolved into water, carbonic acid, nitrogen oxides, and nitrogen. The volume of gas produced is about 10,000 times the initial volume of the nitroglycerine. Explosion can also be effected by heating to about 500° F. one portion of a mass, whereby partial decomposition is set going which almost immediately propagates itself throughout the liquid. The explosive force of nitroglycerine compared with that of an equal volume of gunpowder is as 13:1. If any traces of acid be allowed to remain in nitroglycerine it is liable to undergo spontaneous explosion; hence it is an exceedingly dangerous article to transport or store under such conditions. It is advisable to prepare the substance on the spot where it is to be used, and only in such quantities as may be required for immediate consumption. This method is adopted in many quarries and engineering undertakings. Nitroglycerine has for some time been used in the form of *dynamite,* to produce which it is mixed with some light absorbent substance.

Nitromuriatic Acid. See *Nitric Acid.*

Nitrous Acid. See *Nitrogen.*

Nitrous Oxide. See *Nitrogen.*

Nivose (nēvōz) (literally "snow-month") the name given in the French revolutionary calendar to a winter month beginning December 21 and ending January 19.

Nix (or Nixie), in German mythology, the name of water spirits (male and female), haunting rivers, brooks, ponds, and lakes. The male nixie is sometimes represented as old, sometimes as young, but generally as a malicious being. The female nixie appears as a maiden, who often falls in love with some young man, whom she entices or draws into the water.

Noah, one of the patriarchs of the *Old Testament,* son of Lamech, is described in the book of *Genesis* as being chosen by God for his piety to be the father of the new race which should people the earth after the deluge. Having been warned by God of the coming flood he built a vessel (the *ark*) by his direction, and entered it with his family and all kinds of animals. After the waters had subsided the ark rested on Mount Ararat, where Noah offered a thankoffering to God, and was assured that the earth should never again be destroyed by a flood, as sign whereof God set the rainbow in the clouds. Noah died at the age of 950 years, 350 years after the flood. While modern accounts place Mount Ararat in Armenia, older traditions locate it in the mountains of the Kurds, east of the Tigris.

Nobert's Test Plates, finely ruled glass plates so named from F. Nobert, a German optician, used for testing the power of microscopes. The rulings are executed on the under surface of a piece of exceedingly thin glass by means of a diamond point. Some of these ruled plates have almost the incredible number of 225,187 spaces to the inch.

Nobility, a rank or class of society which possesses hereditary honors and privileges above the rest of the citizens. Such a class is found in the infancy of almost every nation. Its origin may be attributed to military supremacy, to the honors paid to superior ability,

or to the guardians of the mysteries of religion. Among the ancient Romans, the patricians originally formed the nobility; but a new order of nobility arose out of the plebeians, consisting of those who had held curule magistracies and their descendants, enjoying the right of having images of their distinguished ancestors. Among the ancient German tribes only obscure traces of hereditary nobility are found. The dignities of the counts of the Franks, the aldermen and great *thanes* of England, as also the *jarls* (in England *eorlas*) of Denmark, were accessible to every one distinguished by merit and favored by fortune. In Venice a civic nobility grew up consisting of a series of families who gradually acquired all political power and kept it to themselves and their descendants. In England hereditary nobility, the nobility belonging to the titles of duke, marquis, earl, viscount, and baron, is now entirely personal, though formerly, as a result of the Norman conquest, it was connected with the holding of lands. In Spain and Italy still the same rank depends in greater measure upon property, and in France and Germany the *de* and *von* of titles points to the same fact. In France and Germany nobility is common to all the members of the noble family, and the German nobility form a very exclusive caste. In France and Germany the nobles long formed a class of petty sovereigns within their own domains. The French Revolution first deprived the nobles of that country of their privileges and exclusive rights, as that of jurisdiction, etc.; and the decree of June 19, 1790, abolished hereditary rank entirely. Under Napoleon I arose a new hereditary nobility, with the titles of princes, dukes, counts, barons, and chevaliers, which descended to the eldest son. After the restoration of the Bourbons (1814) the ancient nobility reclaimed their former rights and privileges. Nobility was again abolished in 1848, but was restored by Napoleon III. In Norway the Parliament abolished nobility by the three successive decrees of 1815, 1818, and 1821. In Great Britain titles of nobility can only be conferred by the sovereign, and that by patent, in virtue of which they become hereditary. Life peerages also are occasionally conferred. The nobility, as the term is commonly used, consists of those holding the titles already mentioned (or all above the rank of baronet) and their more immediate connections; but if the term were to be used as generally in Europe the gentry would also be included, or all families entitled to bear coat armor. Those of the nobility who are peers of England, of Great Britain, or of the United Kingdom, have a hereditary seat in the House of Lords, while the Scottish peers elect sixteen of their number to represent their order, and the Irish peers elect twenty-eight representatives for the same purpose.

Noctilu'ca, a minute genus of marine animals placed among the Infusoria or the Rhizopoda, which in size and appearance much resembles a grain of boiled sago, or a little granule of jelly, with a long stalk. These minute animals are phosphorescent; and the luminosity which appears at the surface of the sea during the night is chiefly due to them.

Noddy, a sea bird of the family Laridæ (gulls), widely diffused through the northern and southern hemispheres, and well known to sailors for its fearlessness or stupidity, allowing itself even to be taken by the hand; hence its name. The noddy is very abundant in warmer

Noddy.

climates, as in the West Indies. There are several other species differing somewhat in details from *A. stolidus*.

Node, in astronomy, one of the points in which two great circles of the celestial sphere, such as the ecliptic and equator, the orbits of the planets and the ecliptic, intersect each other; and also one of the points in which the orbit of a satellite intersects the plane of the orbit of its primary. The node at which a heavenly body passes or appears to pass to the north of the plane of the orbit or great circle with which its own orbit or apparent orbit is compared is called the *ascending node;* that where it descends to the south is called the *descending node.* At the vernal equinox the sun is in its ascending node, at the autumnal equinox in its descending node. The straight line joining the nodes is called the *line of the nodes.* The *lunar nodes* are the points at which the orbit of the moon cuts the ecliptic.

Node, in physics, a point in a vibrating body, or system of vibrating particles, where there is no movement. When a body is vibrating, the vibratory motion is conveyed from one place to another by the action of the molecular forces of the particles on one another. Now when all the forces acting on a certain particle are at any instant in equilibrium, and the particle consequently remains at rest, there is said to be a *node* at the particle. If a plate of glass or metal be held in the hand, and a bow be drawn across the edge, particles of fine sand, previously placed on the plate, will arrange themselves in lines, along which it is evident no vibration has taken place. These lines, called *nodal lines,* generally form geometrical figures.

Nodosa'ria, a genus of fossil foraminifers, having a shell composed of numerous chambers arranged in a straight line. They occur in chalk, tertiary, and recent formations

Noisseville (nwâs-vēl), a village of German Lorraine to the east of Metz, the scene of a fiercely contested battle during the Franco-German War, Aug. 31 and Sept. 1, 1870, between the forces of Prince Frederick Charles and those of Marshal Bazaine.

Nolle Prosequi (nol'le pros'e-kwī) (Lat. "to be unwilling to prosecute"), in law, a stoppage of proceedings by a plaintiff, an acknowledgment that he has no cause of action.

Nomads, tribes without fixed habitations, generally engaged in the tending and raising of cattle, and changing their abode as necessity requires or inclination prompts. North Africa, the interior of North and South America, and the northern and middle parts of Asia, are still inhabited by nomadic tribes, some of whom are little better than bands of robbers.

Nominalism, the doctrines of those scholastic philosophers who followed John Roscellin, canon of Compiégne in the eleventh century, in maintaining that general notions (such as the notion of a tree) have no realities corresponding to them, and have no existence but as names (*nomina*) or words. They were opposed by the *realists*, who maintained that general ideas are not formed by the understanding, but have a real existence independent of the mind and apart from the individual object. During the twelfth century the controversy between the nominalists and the realists was carried on with great keenness, and in the beginning of the fourteenth the dispute was revived by the English Franciscan William of Occam, a disciple of the famous Duns Scotus. The controversy gave rise to actual persecution and cruelty.

Non Compos Mentis ("not of sound mind"), an expression used of a person who is not of sound understanding, and therefore not legally responsible for his acts.

Nonconformists, those who refuse to conform to an established church. The name first applied to those English clergymen who, at the Restoration, refused to subscribe to the act of Uniformity, and were in consequence ejected from their livings. Relief was afforded by the Toleration act of 1689. The repeal of the Corporation and Test acts in 1828 removed the civil disabilities under which Nonconformists had previously been placed, and religious tests at the universities were abolished in 1871 and 1873.

Nones, 1, in the Roman calendar, the fifth day of the months January, February, April, June, August, September, November, and December, and the seventh day of March, May, July, and October. The *nones* were so called as falling on the *ninth* day before the ides, both days included; 2, the office for the ninth hour, one of the breviary officers of the Roman Catholic Church.

Nonjurors, those who refused to take the oath of allegiance to the government and crown of England at the revolution, when James II abandoned the throne.

Non-residence, failure or neglect of residing where official duties require one to reside, or on one's own lands.

Nonsuit, a term in law. When a person has commenced an action, and at the trial fails in his evidence to support it, or has brought a wrong action, he is nonsuited. A nonsuited plaintiff may afterward bring another action for the same cause, which he cannot do after a verdict against him.

Nootka, an island of Canada on the west coast of Vancouver Island, at the entrance of Nootka Sound, an inlet running about 10 mi. inland.

Nootka Dog, a large variety of dog domesticated by the Indians of Nootka Sound, chiefly remarkable for its long wool-like hair, which when shorn off holds together like a fleece, and is made into garments.

Nord, a department in the northeast of France, bordering on Belgium; area 2,170 sq. mi. The coast, marked by a long chain of sandy hillocks, furnishes the two harbors of Dunkirk and Gravelines. The principal minerals are coal and iron, which are extensively wrought; and the occupations connected with or depending on them render this department among the most important in France. The capital is Lille. Pop. 1,736,341.

Nordau, Max Simon, a Hungarian physician and author, was b. in 1849 in Budapest. After traveling in Europe he went to Paris in 1878. Later he wrote some works which received wide attention and were translated into English. The work, however, upon which his fame rests is known to English readers as *Degeneration*. In this he endeavors to prove that the intellectual activity and excitement of the last half century have resulted in the degeneration of once healthy mental condition into maudlin and emotional sentimentality and salacious impurity.

Nordenfeldt (1844–), a Swedish engineer, the inventor of a machine gun, which bears his name; also of several torpedoes and a submarine boat.

Nordenskiöld (nor'den-sh*eu*ld), Nils Adolf Erik, Baron (1832–), a Swedish naturalist and explorer, b. at Helsingfors. He devoted himself to science, and was appointed to some important posts, but becoming obnoxious to the Russian authorities he settled in Sweden. In 1851 he went with an expedition to Spitzbergen, to which he several times returned, assisting in the measurement of an arc of the meridian and mapping the southern part of Spitzbergen. On a North Polar expedition in 1868 Nordenskiöld reached the high latitude of 81° 42′. Having turned his attention to Siberia, after making two successful voyages through the Kara Sea to the Yenisei, he decided to attempt the accomplishment of the northeast passage, or passage by sea round Northern Asia to the Pacific. Aided by the king of Sweden and others, Nordenskiöld was enabled, July, 1878, to sail in the *Vega*, which was the first vessel to double the most northern point of the Old World, Cape Tchelyuskin, and after passing through Bering's Straits, reached Japan Sept. 2, 1879. The object of the expedition being thus accomplished, Nordenskiöld was enthusiastically welcomed in

Europe, and created a baron by the king of Sweden. He died Aug. 13, 1901.

Nordhausen (nord'hou-zn), a town in Prussian Saxony, 38 mi. n.n w. of Erfurt, pleasantly situated at the foot of the Harz Mountains. It has a Roman Catholic cathedral, a fine late Gothic edifice with a Romanesque crypt, an old townhouse, etc. It manufactures woolen and linen cloth, lacquer ware, chemicals, etc.; and has extensive distilleries and breweries. Pop. 27,083.

Nordica, Mme. (Mrs. Zoltain F. Dome), an American prima donna, b. in Farmington, Me., in 1858, and received her first musical training at the Boston Conservatory of Music. Later she studied in Italy and London. Her impersonation of Marguerite in Gounod's *Faust* was a great triumph.

Norfolk, Norfolk co., Va., on Elizabeth River. Railroads: Chesapeake & Ohio; Norfolk & Western, and others. Steamers run to Richmond and northern and southern cities. It is the principal seaport of the state; exports include cotton, oysters, fruits, peanuts, etc. Has carriage and iron goods factories, flour mills, etc. Pop. 1900, 46,624.

Norfolk (nor'folk), a county of England. Area 1,356,173 acres. This county has a high reputation for its progress in agriculture. The crop raised in greatest perfection is barley, which is its chief agricultural produce. Most of it is made into malt, and then sent elsewhere. The manufactures consist chiefly of woven goods. Norfolk has extensive fisheries of both herring and mackerel, the former being the most important. The county town is Norwich; the chief seaport is Yarmouth. Pop. 456,474.

Norfolk Island, an island in the South Pacific, about 800 mi. e. of New South Wales, with which it is governmentally connected, is about 6 mi. long by 4 broad, and has a fertile soil and salubrious climate, readily producing sweet potatoes, various tropical fruits, wheat, maize, etc. The coasts are precipitous and there is no good landing place. At one point it rises to the height of 1,050 ft. The Norfolk Island pine grows to a great size, but is now comparatively scarce. Discovered uninhabited by Captain Cook in 1774, it was long used as a penal settlement connected with New South Wales, and in 1856 it was assigned to the Pitcairn Islanders for their residence.

Norfolk Island Pine, a tree of the genus *Araucaria* (*A. excelsa*), natural order Coniferæ, formerly abounding on Norfolk Island, where it attains a height of 200 ft. or more, with a diameter of 10 or 11 ft. Its timber is valuable, being white, tough, and close grained. It does not thrive in the open air, but grows remarkably well in conservatories, and is one of the most beautiful of trees. Though an *Araucaria* it is very unlike the common species (*A. imbricāta*).

Noria, a hydraulic machine used in Spain, Syria, Egypt, and other countries for raising water. It consists of a water wheel with revolving buckets, or earthen pitchers, like the Persian wheel, but its modes of construction and operation are various. As used in Egypt it is known as the *sakieh*. These machines are generally worked by animal power, though in some countries they are driven by the current of a stream acting on floats or paddles attached to the rim of the wheel.

Nor'icum, among the Romans, a region that corresponded nearly to what is now Upper and Lower Austria and Styria.

Normal, in geometry, a perpendicular; the straight line drawn from any point in a curve at right angles to the tangent at that point; or the straight line drawn from any point in a surface, at right angles to the tangent plane at that point.

Normal Schools, called also Training Colleges, schools in which teachers are instructed in the principles of their profession and trained in the practice of it. The name is derived from the French *écoles normales*, established at the close of last century. These schools are now numerous in all countries that have a well organized system of education. They may be either for teachers in elementary schools or for those of the secondary schools, and may be for males or females only or for both combined. In the U. S. the normal school system is highly developed.

Norman Architecture, the round arched style of architecture, a variety of the Romanesque, introduced at the Norman Conquest from France into Britain, where it prevailed till the end of the twelfth century. In its earlier stages it is plain and massive with but few moldings, and those principally confined to small features; as the style advanced greater lightness and enrichment were introduced, and some of the later examples are highly enriched. The chevron, billet, nailhead, and lozenge moldings are distinctively characteristic of this style. The more specific characteristics of churches in this style are: cruciform plan with apse and apsidal chapels, the tower rising from the intersection of nave and transept; semi-cylindrical vaulting; the doorways deeply recessed, with highly decorated moldings; the windows small, round-headed, placed high in the wall, and opening with a wide splay inside; piers massive, generally cylindrical or octagonal, and sometimes enriched with shafts; capitals cushion-shaped, sometimes plain, more frequently enriched; buttresses broad, with but a small projection; walls frequently decorated by bands of arcades with single or interlacing arches. In course of time the arches began to assume the pointed character; the piers, wall, etc., to be less massive; short pyramidal spires crown the towers; and altogether the style assumes a more delicate and refined character, passing gradually into the Early English. Besides ecclesiastical buildings the Normans reared many castellated structures, the best remaining specimen of which is the Keep of the Tower of London. The Norman architects were not distinguished for science in construction. The walls of their buildings were of great thickness, and the piers supporting their arches were usually of immense girth, yet notwithstanding the massive-

ness their works frequently gave way. The Abbaye aux Hommes and the Abbaye aux Dames at Caen, Normandy, afford excellent examples of this style; as also parts of the cathedrals of Durham, Peterborough, Norwich, and Canterbury, as well as many smaller churches.

Norman Conquest, in English history, the successful attempt made by William of Normandy in 1066 to secure the English crown from his rival Harold, son of Earl Godwin. It was no real conquest of the land and people by an alien race, but rather resembled in its chief characteristics the accession of William of Orange to the throne in 1688.

Nor'mandy, an ancient province in the north of France, now divided into the departments of Seine-Inférieure, Eure, Orne, Calvados, and Manche. On the decline of the Roman Empire it was seized by the Franks, and afterward, in the tenth century, wrested from them by the Normans or Northmen, from whom it received its name. Charles the Simple gave his sanction to the conquest made by the Normans, and Rollo, their chief, received the title of Duke of Normandy. William the Bastard, sixth in succession from Rollo, having become king of England in 1066, Normandy became annexed thereto. On the death of William it was separated from England and ruled by his son Robert, and was afterward ruled by the kings of England until Philip Augustus wrested it from John and united it to France in 1203. Although several times invaded by the English, it was finally recovered by the French in 1450. Normandy is one of the richest and most fertile parts of France.

Norman French, a dialect of old French which became the Anglo-Norman of England. It was the language of legal procedure in England till the time of Edward III, and is still used in several formal proceedings of state.

Normans (literally "north men"), the descendants of the Northmen who established themselves in Northern France, hence called Normandy. Besides the important place occupied in history by the Normans in Normandy and England, bands of Normans established themselves in South Italy and Sicily, and Norman princes ruled there from the middle of the eleventh till the end of the twelfth century.

Norns, in Scandinavian mythology, the three Fates, representing the *past*, the *present*, and the *future*, whose decrees were irrevocable. They were represented as three young women, named respectively Urd, Verdandi, and Skuld.

Norristown, Montgomery co., Pa., on Schuylkill River. Railroads: Pennsylvania; Philadelphia & Reading; Stony Creek. Manufactures include shirts, hosiery, glass, flour, tacks, machinery, furniture, asphalt blocks, etc.; has 12 iron works, 18 woolen, carpet, and cotton mills. Near by are iron mines and deposits of sandstone, limestone, and marble. It is the seat of Eastern Pennsylvania State Hospital for the Insane. Pop. 1900, 22,265.

Norrköping (nor-cheup'ing), a town of Sweden, at the mouth of the Motala Elf, in the Bravik, a gulf of the Baltic. The Motala Elf flows through the town, making several falls within it, and is crossed by several bridges. It has manufactures of woolens, cottons, etc., and has sugar refineries and shipbuilding yards. Pop. 28,993.

Norse, the language of Scandinavia. *Old Norse* is represented by the classical Icelandic, and still with wonderful purity by modern Icelandic. The literature includes the early literature of the people of Norway, Sweden, and Iceland.

Norte (nor'tā), Rio Grande del, a river of Mexico, rising in the Rocky Mountains and emptying itself into the Gulf of Mexico. Its mouth is 1,200 ft. wide, but is barred so as to afford entrance only to boats. Length about 2,000 mi.

North, Frederick, Lord (1732–1792), earl of Guildford, the eldest son of Francis, second earl of Guildford. He belongs to American history as chief of the British administration during the Revolution. Obtaining a seat in the House of Commons he was, in 1759, appointed a commissioner of the treasury, but resigned in 1765, when he joined the opposition to the Rockingham ministry. He came into office again with the Graffon ministry, 1766; in 1767 became chancellor of the exchequer; and in 1770 succeeded the Duke of Grafton as minister, when his retention of the tea duty, imposed upon the American colonists, led to the rising in America, and to the Declaration of Independence, July 4, 1776. Lord North resigned on March 20, 1782. He became Earl of Guildford by the death of his father in 1790.

North Adams, Berkshire co., Mass., near west end of Hoosac Tunnel. Railroads: Fitchburg; Boston & Albany. Industries: Cotton and woolen mills, shoe factories, nitroglycerine, etc. Pop. 1900, 24,200.

North America. See *America.*

Northamp'ton, a borough of England, capital of the county of same name. The staple manufacture is boots and shoes for home and export trade. The currying of leather is also carried on on a large scale. There are also iron and brass foundries, breweries, corn mills, etc. Ironstone is found in the neighborhood, and smelting furnaces are at work. Pop. 61,016. The county has an area of 629,912 acres. The principal grain crops are wheat, barley, and oats. The rearing of sheep and cattle is a principal object with the Northamptonshire farmers. Ironstone of excellent quality is found in vast beds, and of late years this has developed into an important industry. Pop. 302,184.

Northampton, Hampshire co., Mass., on Connecticut River, 105 mi. w. of Boston. Railroads: Boston & Maine, and N. Y., N. H. & W. Industries: silk manufacturing, basket, hair brush, wire, oil stoves, and farm implement factories. Surrounding country agricultural. The town was first settled in 1654, and became a city in 1883. Pop. 1900, 18,643.

North Attleboro, Bristol co., Mass., 14 mi. n.e. of Providence, R. I. Railroad, Old Colony.

Manufactures include jewelry, etc. Pop. 1900, 7,255.

North Borneo, the territory occupying the northern part of the island of Borneo (which see) under the jurisdiction of the British North Borneo Company, having been ceded by the sultans of Sulu and Brunei in 1877-78 and the company having received a royal charter in 1881. The territory embraces 31,000 sq. mi., and has a pop. of 150,000. The interior is very mountainous, one summit, Mount Kini Balu, rising to a height of 13,700 ft. A large portion of the surface is forest and jungle. There is a coast line of 900 mi., and several splendid harbors. Coal and gold have been found, and the territory is believed to be very rich in minerals. The exports comprise wax, edible birds' nests, cocoanuts, gutta-percha, sago, tobacco, rattans, india rubber, and timber. With a good climate and a fertile soil there is believed to be a great future before North Borneo. Along with Brunei and Sarawak the territory was made a British protectorate in 1888.

North Cape, a celebrated promontory, forming the most northern point of Europe, and situated on the north of the island of Mageröe, which is separated from the mainland of Sweden by a narrow channel.

North Carolina (kar-o-li'na), the *Old North State,* of the South Atlantic group, one of the original thirteen; is bounded on the n. by Virginia, on the e. by the Atlantic Ocean, on the s. by South Carolina and Georgia, and on the w. by Tennessee. The extreme length of the state from e. to w. is 503¼ m.; average breadth, 100 m.; extreme breadth, 187½ m.; gross area, 52,286 sq. m. The population in 1900 was 1,893,910, of which 630,207 were colored.

Surface.—The surface is a vast declivity sloping from the summits of the Smoky mountains, an altitude of nearly 7,000 feet, to the level of the Atlantic ocean. The Smoky mountains constitute a part of the Appalachian chain, which here attains its greatest height. The highest mountain is Mitchell's Peak. The slope is made up of three wide extended terraces, a high mountain plateau, distinguished as the mountain section; a submontane plateau, or middle section; and the Atlantic plain, or low country. The Smoky mountains are known under the various names of the Iron, Smoky and Unaka mountains. East of this long chain is the Blue Ridge. The region is well watered by the Roanoke, Neuse, Cape Fear, Tar, Catawba and Yadkin rivers, with their numerous tributaries. The coast line is about 300 miles long and is skirted by low, narrow, sandy islands, separated from the mainland by sounds, chief of which are the Albemarle, Roanoke and Pamlico sounds. Capes Hatteras, Lookout and Fear are dangerous promontories.

Climate.—North Carolina lies on the same parallel of latitude as the central Mediterranean basin, but its climate is modified by the proximity of the ocean on the e. and the great mountain system on the w. The mean temperature for the state is 59°. January is the coldest month of the year, but at no point does the thermometer register lower than 31°. July is the warmest month with no normal higher than 81°. The rainfall is uniformly distributed throughout the year, the normal average precipitation being 52 in. The average snowfall is 5 in. and never remains on the ground more than a day or two. The storms on the Atlantic coast, especially off Hatteras, are violent and often destructive to shipping.

Mining.—Iron ores, copper, silver and gold are widely distributed throughout the state. The value of gold and silver produced in 1899 was $34,888. Gems such as the diamond, ruby, sapphire, emerald, beryl, amethyst andgarnet have been found. In 1899, North Carolina produced 47,616 long tons of iron ore. The history of coal mining dates from 1889, when the yield was 192 tons; in 1899, the total product was 26,896 tons. Other minerals are limestone, granite, marl, phosphate, gneiss, sandstones, talc, baryta, corundum and mica.

Agriculture.—North Carolina is an agricultural state. The mountains are covered with deep, rich soil and clothed with massive forests to their tops. The mountains and adjacent valleys furnish a rich pasturage for cattle; stock-raising is extensively carried on in this section. Truck-gardening and fruit-raising are also important industries. The cabbage and the Irish potato grow especially well here. The leading crops of the middle region and of the Atlantic plain are cotton, tobacco, rice, peanuts and Indian corn. In the Lower Piedmont region, the peach industry has developed to a great commercial enterprise.

Manufactures.—The manufacturing interests are steadily increasing. The value of manufactured products in 1900 was $94,919,663. The chief manufacturing towns are located in the middle region where the water-power is abundant. The leading industries, ranked according to the value of their output, are the manufacture of cotton goods, lumber and timber products, tobacco, flouring and grist mill products, cottonseed oil and cake, furniture, car and ship construction, leather and fertilizers The state ranks third in the cotton mill industry. Durham, Winston, Charlotte, Wilmington and Raleigh are important manufacturing cities. Fishing is one of the most important industries, the total value of products in 1900 being $1,500,000. The great fish shipping centers are Elizabeth City, Manteo, Washington, Currituck, Edenton, Morehead City, Beaufort and Wilmington. The chief fisheries are shad, oyster, herring, mullet, salt water trout and striped bass.

Transportation.—North Carolina has three great railway systems: the Atlantic Coast Line, the Southern and the Seaboard Air Line. There are also a number of individual lines and branches. The total mileage is 3,651. The customs districts are Albemarle, Wilmington, Pamlico and Beaufort; and the chief exports are tar, turpentine, resin, lumber, cotton, tobacco, flour and fish. Wilmington has the best harbor, is the commercial metropolis and

has steamship lines to New York, Philadelphia and Baltimore. The Dismal Swamp canal affords communication between Albemarle Sound and Chesapeake Bay.

Education.—All the larger cities and towns are provided with public graded schools and most of them with public high schools, supported by special taxes. Institutions for higher education are the University of North Carolina at Chapel Hill, College of Agriculture and Mechanical Arts at Raleigh, State Normal and Industrial College at Greensboro, Davidson College at Davidson, Trinity College at Durham, and Wake Forest College at Wake Forest. There are a number of well-equipped colleges for the colored race.

History.—North Carolina was first explored by a company sent out by Sir Walter Raleigh in 1584, and the first settlement was made on Roanoke Island, 1585. In 1586, the settlement was abandoned. Raleigh sent out another colony which landed at Roanoke in 1587. In this colony was born Virginia Dare, the first white child born in America. The Roanoke Colony was again abandoned and no further attempt at colonization was made until 1629, when Charles I granted a charter to Sir Robert Heath. The first permanent settlement was called the County of Albemarle. The colony was under the Crown from 1728 to the Revolution. North Carolina was most forward in resisting the aggressions of Great Britain. On the 20th of May, 1775, North Carolina colonists met at Charlotte and declared their independence. In the winter of 1775-76, North Carolina troops under Howe helped drive Lord Dunmore from Virginia. On April 25, 1776, North Carolina, first of all the colonies, empowered her delegates to the Continental Congress to vote for independence. Her troops were among the picked men who under Wayne stormed Stony Point. After the Revolution, the state steadily increased in wealth and power, but as the people did not engage to any extent in manufacturing, no large cities were built and the resources did not keep pace with the growth in population. North Carolina was slow to adopt the ordinance of secession, but having once adopted it, was loyal to the Confederate cause. Wilmington was largely used by the Confederates as a point to and from which their steamers could run despite the blockade. The state furnished 125,000 soldiers and lost more men than any other southern state. Since the close of the Civil War North Carolina has grown remarkably, owing to the interest developed in manufacturing. The principal cities, with their population in 1900, are: Raleigh, the capital, 13,643; Wilmington, 20,976; Charlotte, 18,091; Asheville, 14,694; and Winston, 10,008.

North Dakota, the *Flickertail State,* one of the North Central states; is bounded on the n. by Assiniboia and Manitoba; on the e. by Minnesota, from which it is separated by the Red River of the North; on the s. by South Dakota; and on the w. by Montana. The extreme length from e. to w. is 360 m., and its greatest breadth from n. to s., 210 m.; area, 74,212 sq. m. Population in 1900, 319,146, of which 6,968 were Indians. In 1901 the population was estimated by the government actuary at 333,000.

Surface.—Almost the entire surface consists of rolling prairie, with no important prominences. The state is naturally divided into the Red River valley, the James River valley, the Devil's Lake and Turtle Mountain region, the Mouse River valley, the Missouri slope and the West North Dakota division. The valley of the Red river is broad and almost perfectly level, and contains soil of unusual fertility. The James River valley is noted for its artesian wells. The region west of the Missouri is more uneven, containing deeper valleys and higher prominences than the rest of the state. Besides the rivers already named, the Cheyenne, Cannon Ball, Green, Sweetbrier, Curlew and Little Missouri are worthy of mention. Devil's Lake, having an area of about 100 sq. m., is the only lake of importance.

Climate.—The winters are severe, but the dryness of the atmosphere enables man and beast to endure the extreme cold. The snowfall is light, but severe storms (blizzards) from the northwest occur several times during the season. Summer follows winter in quick succession, and is characterized by warm, pleasant days, cool nights and severe thunderstorms. The mean annual temperature is 39.4° at Bismarck, 37° at Fargo, and 34.4° at Pembina. The mean annual rainfall varies in different sections. At Fargo it is 27.17 in., at Pembina 21.91, at Bismarck 20.10, and at Fort Buford 13.91.

Agriculture.—Both soil and climate are especially adapted to raising wheat of a high grade, and North Dakota in 1901 ranked as the second wheat producing state, the crop amounting to 78,780,000 bushels. Corn, oats, flax and potatoes are also important crops. The raising of livestock is the most important industry of the western portion of the state. In 1900, the total value of domestic animals was $23,807,321. Dairy products and wool are also important sources of revenue. The most valuable farms are in the Red River valley.

Minerals.—Clays from which excellent brick and pottery are made, abound in various localities; building-stones are found in the Turtle Mountain region, and the region west of the Missouri is underlain with vast deposits of lignite of good quality. This outcrops in many places so that farmers can mine their own coal. In other localities the mines are worked by corporations. This is the only mining industry of importance in the state. The output is about 200,000 tons annually.

Manufactures.—The manufacture of flour and gristmill products is the leading industry. The other manufactures are closely allied with the industries of the state and their products have a local market. The entire output of manufactured products for 1900 was valued at $9,287,259, of which 45 per cent was flour and gristmill products.

Transportation.—The Missouri river is nav-

igable through its entire course in North Dakota. The Great Northern and Northern Pacific railways traverse the state from e. to w. and have numerous branches extending n. and s. The Chicago, Milwaukee & St. Paul and Chicago & Northwestern systems also enter the state from the s. In all, North Dakota had, in 1902, 3,100 miles of railway.

Education.—While a territory, Dakota made ample provision for public schools, and when admitted to statehood, North Dakota extended and planned to perfect the system already established. Besides the permanent school fund, liberal grants of land were made for sustaining higher institutions, and within a few years the income from these grants will support their respective schools without taxation. The state university is located at Grand Forks, the state agricultural college at Fargo, the state normal schools at Mayville and Valley City, the school for the deaf and dumb at Devil's Lake, the reform school at Mandan, and the school for the feeble-minded at Jamestown.

History.—The territory of Dakota was named after a family of Indians and was obtained by the U. S. through the Louisiana purchase in 1803. The first real and permanent white settlement in this territory was probably established by French-Canadian settlers near Pembina in 1807. In 1812, Lord Selkirk, by mistake, built his fort south of the Canadian line. There were fur trading posts established as early as 1808. In 1851, a large portion of the territory was opened to white settlement. The territory was organized in 1861. Yankton was the capital until 1883, when Bismarck became the seat of government. In 1889, provision was made to admit it into the Union as two states, North and South Dakota. The principal cities are Bismarck, the capital, population 1900, 3,319; Fargo, 9,589; Grand Forks, 7,652.

Northern Drift, in geology, a name formerly given to boulder clay of the Pleistocene period, when its materials were supposed to have been brought by polar currents from the north.

Northern Lights. See *Aurora Borealis.*

Northern Mythology, the mythology of the Scandinavian people, according to which there were originally no heavens above, no earth below, but a bottomless deep, north of which was a world of mist and southward a world of light. From the latter, a warm wind blew over the ice of the world of mist and melted it. From the vapors sprang Ymir, the frost giant, with his progeny, and the cow, Audhumbla. While the cow was one day licking the salt from the ice blocks, human hair grew out of them, then next day a head, and on the third day an entire man, Bori, from whom and his wife, a daughter of Ymir, sprang Bor the father of Odin, Villi and Ve, who slew the giant Ymir and out of his body formed the earth and heavens. They then created man and woman and placed them upon the earth. A mighty ash tree supported the whole universe. The gods dwelt in Asgard, and Odin, their king, lived in a golden palace, Valhalla, with his wife, Frigga. The Valkyries were his messengers whom he sent to every battlefield as "choosers of the slain." Other gods were Thor, the thunderer; Balder, the god of love and beauty; Freyr, the lord of light; Loki, the contriver of all fraud and mischief; and Freya, the goddess of love. The northern nations believed that a time would come when all visible creation would be destroyed, a "twilight of the gods," after which a new heaven and a new earth would rise out of the sea, and gods and men would live happily together. See *Edda, Mythology* and *Sagas.*

Northern Securities Company, a corporation formed in New Jersey, Nov. 13, 1901, for the purpose of controlling the stocks of several railway systems, particularly the Northern Pacific, Great Northern and the Burlington. The capital was placed at $400,000,000. James J. Hill was chosen president and J. Pierpont Morgan, George F. Baker, and other noted railway financiers were prominent in the organization. Since 1870, many short railway lines have combined into systems for the purpose of convenience and economy in management. But a decision of the Supreme Court of the U. S. that a traffic arrangement, in which two or more roads agreed to maintain rates, was contrary to a certain section of the Interstate Commerce Act, left the railways in a disorganized condition as to their arrangements with each other. In 1899, consolidations were brought about by the holders of stock in one company buying stock in other competing lines, until the owners of all lines in a given section came to have a community of interests. By 1901, nearly all the important lines of railway in the country were controlled under eight systems. The formation of the Northern Securities Company resulted from a conflict, brought on by an attempt by the Harriman interests to secure control of a part of the Hill-Morgan system. The members of the company purchased stock in the company instead of in the railways. An injunction suit was brought by the State of Minnesota on the ground that the organization violated the constitution and laws of the state. This suit is still pending (1904). The U. S. government also brought suit on the ground that it was a violation of the Sherman Anti-trust Law prohibiting combinations "in restraint of trade." On Mar. 14, 1904, the U. S Supreme Court compelled the dissolution of the company.

Northmen or Norsemen, a name applied to the Teutonic inhabitants of Scandinavia; but, more particularly, to those bold sea rovers, who sailed from the Scandinavian coasts and ravaged Great Britain and other parts of northern and western Europe from the eighth to the eleventh century A. D. They were known to the French and Germans as Northmen and to the inhabitants of the British isles as Danes and Eastmen. They called themselves *Vikingar*, or Vikings (which see) and their leaders took the name of Sea-Kings. They were a vigorous race, fond of warlike adventure and worshippers of the heathen gods, Thor and Odin. The chief causes of

their plundering expeditions were, no doubt, the over-population and scarcity of food in their native homes; discontent at political conditions existing there, and their natural love of adventure. With their small, sharp-prowed, open vessels they scoured the coasts of England, Germany and France, besieging and sacking cities and sailing away laden with rich booty. They also ravaged the eastern coasts of the Baltic and the Mediterranean shores. They made permanent settlements in the Orkneys, the Hebrides and northern France, where they were called Normans (which see). They left colonies also in the Faröe Islands and in Iceland, whence some of them went to Greenland (982). There is a story which is, however, now discredited, that in 1002 the Viking Lief Ericson visited the coast of New England and named it *Vinland*.

North Polar Expeditions, expeditions of exploration in the regions about the North Pole. The object of the earliest expeditions to the Arctic regions was to discover a shorter commercial maritime route to China and India. The first expedition for the discovery of the northeast passage was that of Sir Hugh Willoughby in 1553. The search was actively continued by Burroughs (1556), Barentz (1594–96), Hudson (1608–09), and Behring (1741). These expeditions rendered good service to geography, by making accurate surveys of Spitzbergen, Nova Zembla and Waygatz; but it was in 1878 that the Swedish explorer, Nordenskjöld, discovered the northeast passage.

More than 200 voyages were made in search of the northwest passage, the first being that of John Cabot (1497). Sebastian Cabot (1517), Martin Forbisher (1576), John Davis (1585–88), Henry Hudson (1607), William Baffin (1613), John Phipps (1773) and William Scoresby (1806), successively engaged in this enterprise. Scoresby reached lat. 81° 30′ n. and added much to our knowledge of the coast of Greenland. It was about this time that scholars and explorers began to be especially interested in polar research for purely scientific reasons. Scoresby firmly believed that the North Pole could be reached and was the first to propose the use of a vehicle which could be utilized either as a sledge or boat. In 1827, Capt. W. E. Parry, an Englishman, sailed in command of an expedition fitted out in accordance with Scoresby's plans. The highest point reached by him was lat. 82° 45′ n. Two years later, Capt. John Ross discovered the magnetic pole. We now come to the unfortunate expedition of Sir John Franklin, which sailed from England May 19, 1845, and was last seen in Baffin's bay. Many English and American expeditions were sent out in search of the missing explorers. One of these, under the command of Sir Robert McClure, penetrated from Bering strait to Baffin's bay and thus discovered the northwest passage.

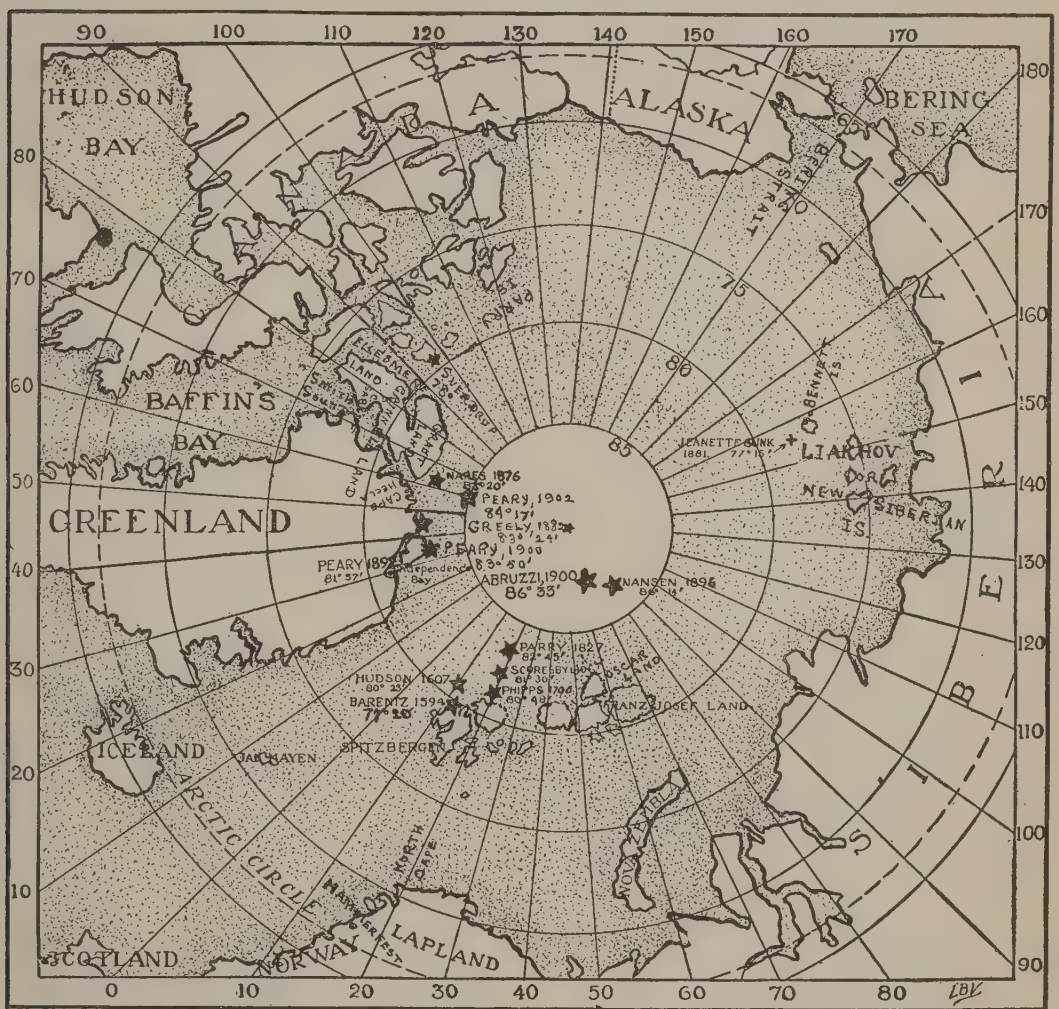
In the year 1873, an Austro-Hungarian expedition under Lieuts. Weybrecht and Payer discovered Franz-Joseph Land. An English Arctic expedition under Capt. G. S. Nares sailed in 1875 through Smith sound. In 1876, a party of his men under Albert Markham traversed the frozen surface of the Polar sea to the north of Grinnell Land, reaching lat. 83° 20′ n. On July 8, 1879, an American expedition fitted out by James Gordon Bennett and commanded by Lieut. De Long, U. S. N., sailed from San Francisco. Three islands were discovered, the most northerly being Bennett island in lat. 77° 8′ n.; but the ship was crushed by ice to the north of Siberia, and De Long and most of his companions died of starvation. For the winter of 1882–83, by international co-operation, stations were established at many points near or within the Arctic circle, for meteorological, magnetic and electrical observations. The most northerly of these was at Lady Franklin bay on the eastern coast of Grinnell Land, lat. 81° 44′ n., under the American Lieut. A. W. Greely. The party wintered two years at Discovery Harbor, whence expeditions were sent out into the interior of Grinnell Land and across the straits into Greenland. One of the parties, under Brainard and Lockwood, reached in May, 1882, lat. 83° 24′ n. After making valuable geographical discoveries and recording extensive meteorological observations, the party retreated southward in August, 1883, and wintered at Cape Sabine, where all save seven perished from cold and starvation.

During the last twenty years, Arctic explorers have agreed that the North Pole can be reached, but the vexed question is, which is the best route, the Smith sound route, the Franz-Joseph Land route or the Bering strait route. There have been but few expeditions by way of Bering strait. A modification of the plans heretofore employed is that of the Norwegian explorer, Fridjof Nansen — to utilize the ocean current which sweeps from Bering strait and the vicinity of the new Siberian islands across the pole toward Greenland. On June 24, 1893, Nansen sailed northward from Christiana on the *Fram*, a vessel specially constructed for the voyage and equipped with provisions and fuel for the five years. By Sept. 22, he was shut in by ice and began his northward drift. On March 14, 1895, when in lat. 83° 59′ n. he left the ship and proceeded toward the pole with dog-sledges. In August, 1896, he returned safely, having reached lat. 86° 14′ n. The *Fram* arrived safe and sound at Hammerfest Aug. 21, having reached lat. 85° 57′ n. and having found open water at lat. 83° 14′ n. On June 12, 1899, the Duke of Abruzzi, an Italian explorer, set out for the North Pole. He spent one winter in the Bay of Teplitz and would have spent a second had not an injury to his vessel compelled his return. One of his sledge parties under Capt. Umberto Cagni, attained lat. 86° 33′ n., the northernmost latitude yet reached. His explorations determined the boundary of Franz-Josef Land.

Most American explorers have passed up Davis strait, Baffin's bay and Smith's sound and through Kennedy channel, but have not yet succeeded in sailing by this route into the open Arctic ocean. In 1898, two expeditions, one American, led by Robert E. Peary, U. S. N.,

North Polar Expeditions

and the other Norwegian, under Capt. Sverdrup, sailed up the west coast of Greenland bound for the North Pole. Sverdrup returned Aug. 29, 1902. The main fruits of his expedition were the mapping of the s. w. and w. coasts of Ellesmere Land, and the discovery of islands to the north of the Parry archipelago. Much interest centered in the expedition of most northerly known land in the world. (2) Proof that from the north of Greenland an ice-covered sea sweeps unbroken around the pole. (3) Valuable additions to the data concerning Arctic fauna, flora, geology and meterology. (4) The highest altitude yet attained in the Western Hemisphere. Lieut. (now Commander) Peary is preparing to make another



North Polar Region.—Stars Indicate Advance Made Toward the Pole from 1594 to 1902.

Peary, who had already made four expeditions to the Arctic regions, the most remarkable being his sledge journey of 1,300 miles in 1892, when he discovered Independence bay, lat. 81° 37′. Peary believes in the Smith sound route. In his dash for the pole in 1902, however, he was not able to proceed beyond lat. 84° 17′ n. mainly because of lack of men and the delay in starting across the sea-ice, due to the fact that his headquarters were too far south of the Polar ocean. The results of the expedition were: (1) The rounding of the northern limit of the Greenland archipelago, the attempt to reach the pole. It is proposed to start not later than July 1, 1904; to establish headquarters on the furthest attainable land, supported by a line of caches down to the limit of regular navigation, and thence to force his way northward to Grant Land where he hopes to establish winter quarters on the northern shores. The distinctive features of his plan are a light pioneer party to go in advance of the main party, the use of individual sledges drawn by dogs, the adoption of Eskimo costume and methods, and the fullest utilization of the Eskimos themselves. Early

in February he plans to start due north over the Polar pack.

The following is a record of the highest north made in Arctic explorations during the past 300 years:

EASTERN HEMISPHERE.

Commander	Date	N. Lat.	Locality
Barentz	July, 1594	77° 20′	Nova Zembla
Hudson	July, 1607	80° 23′	Spitzbergen Sea
Phipps	July, 1773	80° 48′	Spitzbergen Sea
Scoresby	May, 1806	81° 30′	Spitzbergen Sea
Parry	July, 1827	82° 45′	Spitzbergen Sea
Nansen	Apr., 1896	86° 14′	North of Franz-Joseph Land
Abruzzi	Apr., 1900	86° 33′	North of Franz-Joseph Land

WESTERN HEMISPHERE.

Commander	Date	N. Lat.	Locality
Davis	June, 1587	72° 12′	West Greenland
Hudson	June, 1607	73° 00′	Opposite East Greenland
Baffin	July, 1616	77° 45′	Smith Sound
Kane	June, 1854	80° 10′	Smith Sound
Hall	Aug., 1870	82° 11′	Greenland Waters
Nares	May, 1876	83° 20′	Grinnell Land
Greely	May, 1882	83° 24′	North Greenland
Peary	Apr., 1902	84° 17′	North of Grinnell Land

North Sea (or German Ocean), a large branch of the Atlantic Ocean lying between Great Britain and the continent of Europe, having the former and the Orkney and Shetland islands on the w.; Denmark and part of Norway on the e.; Strait of Dover, part of France, Belgium, Holland, and Germany on the s.; and the Northern Ocean on the n. Extreme length from the Strait of Dover to Unst, the most northern of the Shetland Isles, about 700 mi.; greatest breadths between Haddingtonshire, Scotland, and Denmark, about 420 mi.; area not less than 140,000 sq. mi. The North Sea is the deepest on the Norwegian side, where the soundings give 190 fathoms; but its mean depth is no more than 31 fathoms. The fisheries, especially of herring, cod, ling, haddock, flatfish, etc., are exceedingly valuable. The rise and fall of the tide is very great at certain places. Navigation, on account of sand banks, etc., is dangerous.

North Sea and Baltic Canal, a great ship canal, built by the German Empire, from Brunsbüttel at the mouth of the Elbe to the southernmost part of the Eider, and thence along the course of that river to Rensborg, from which place it follows the same course as the present Eider Canal to where it joins the Baltic at Holtenau, near Kiel. The waterway is 185 ft. wide at the surface and 85 ft. at the bottom, with a depth of 25 ft., and is intended for the passage of men-of-war as well as merchant ships, serving thus a double purpose. Its length is 61 mi. The foundation stone of the new lock at Holtenau was laid by the Emperor William I in June, 1887. The total cost of the construction was 156,000,000 marks ($39,000,000), toward which Prussia contributed fifty millions. The canal was completed in 1895.

North Sea Canal (called in Holland the Amsterdam Canal); a great ship canal that connects Amsterdam with the North Sea, running east and west across the narrow neck of land that unites North Holland to the rest of the kingdom.

North Star, the north polar star, the star *a* of the constellation Ursa Minor. It is close to the true pole, never sets, and is therefore of great importance to navigators in the northern hemisphere.

North Tonawanda, village in Niagara co., N. Y., opposite Tonawanda; on the Niagara river, Tonawanda creek and the Erie Canal; and on the Erie, the Lehigh Val. and the N. Y. Cent. & Hud. R. railroads. It has extensive lumber and iron interests, iron smelting works and flour mills and manufactures merry-go-rounds. Pop. 1900, 9,069.

Northum'berland, a northern maritime county of England. Area 1,290,312 acres. The highest hills, the Cheviots, on the northwest border, toward Scotland, are admirably suited for pasture lands, and are extensively used for feeding the breed of sheep to which they give their name. Coal measures occupy an area of 180 sq. mi., and yield immense quantities of coal; lead, iron, limestone, and freestone are also wrought. The chief industries include shipbuilding and ropemaking, forges, foundries, iron, hardware, and machine works, chemical works, potteries, glass works, etc. The coast abounds in cod, ling, haddock, soles, turbot, herrings, and a variety of other fishes. Principal towns: Newcastle, Tynemouth, Shields, Morpeh, and Alnwick. Pop. 506,096.

Northum'bria, one of the seven Saxon kingdoms of Britain, founded by Ida, an Anglian chief in 547. During the eighth century it was the home of Bede, Alcuin, Egbert, and other great scholars. It was the scene of important events till the grant of the Lothians to the king of Scots, and its final conquest by William I.

Northwestern University, an institution of higher learning at Evanston and Chicago, Ill., founded in 1851 under the auspices of the Methodist Episcopal Church. It comprises a college of liberal arts and school of music and oratory (at Evanston), and schools of law, medicine, pharmacy and dentistry (in Chicago). Two schools of preparatory instruction are maintained by the university, the academy in Evanston and the Grand Prairie Seminary at Onarga. The Garrett Biblical Institute, the Norwegian-Danish Theological School and the Swedish Theological Seminary, all at Evanston, also maintain close relations with the university. In 1904, the faculty numbered 304, the students 3,691, and the library contained 78,000 volumes. The president is Edmund J. James.

Northwest Passage, a passage for ships from the Atlantic Ocean into the Pacific by the northern coasts of the American continent, long sought for, and at last discovered in 1850-51 by Sir R. MacClure.

Northwest Provinces, a political division (lieutenant governorship) of British India; area 86,983 sq. mi. The administrative headquarters of the lieutenant governor is at Allahabad. It also contains many of the most notable cities in Indian history, while at the present time it has a large agricultural population and numerous commercial centers. The climate as a whole may be described as dry and hot, the more oppressive districts being in the plains about Allahabad and Benares. Its principal exports are in raw agricultural produce, such as wheat, oil seeds, indigo, cotton, opium, and tobacco. The provinces are Meerut, Rohilkand, Agra, Jhansi, Allahabad, Benares, Kumaun, with the native states of Garhwal and Rampur. Pop. 33,461,878.

Northwest Territories, that portion of northwestern Canada outside the provinces of Ontario, Quebec, Manitoba, and British Columbia, formerly the Hudson Bay Territory; estimated area 2,648,000 sq. mi. This region is governed by a lieutenant-governor and a council of three members, there being also a legislative assembly partly elected, partly nominated. Regina is the seat of government. This territory is divided into the districts of Assiniboia (88,279 sq. mi.), Saskatchewan (103,845 sq. mi.), Alberta (101,520 sq. mi.), Athabasca (239,500 sq. mi.), Mackenzie (481,200 sq. mi.), Ungava (276,000 sq. mi.), and Franklin (area unknown). The agricultural and other capabilities of at least a third of this region are very great, there being vast areas adapted for wheat, oats, barley, etc., or for stock rearing; and land in the districts just mentioned is being rapidly taken up. Coal is abundant, and is now being worked; petroleum also is abundant; copper, silver, iron, salt, and gold have been found in various localities. Great quantities of furs are obtained, especially by the agents and employees of the Hudson Bay Company, to whom the whole formerly belonged, and who have many outlying forts and stations. There are many lakes and rivers, the former including Athabasca, Great Slave Lake, Great Bear Lake, etc.; and the latter the Saskatchewan, Athabasca, Peace, Mackenzie, etc., giving 10,000 mi. of navigable rivers. The Canadian Pacific Railway crosses the southern part of this magnificent territory, and towns and villages are rapidly being formed along its course. There are several other railways made or to be made, one running northwest from Regina to Battleford and Edmondton. Schools are being established in the more thickly settled parts, and education is free. In the Rocky Mountain region five tracts of land have been reserved as national parks, on account of their interesting scenery. One of these, 260 sq. mi. in area, presents a remarkable aggregate of lake, river, and mountain scenery, including the hot mineral springs of Banff, which are already being taken advantage of by persons suffering from various ailments. Pop. 1901, 220,000.

Norwalk, Fairfield co., Conn., on Long Island Sound and Norwalk River, 42 mi. from New York. Railroad, N. Y., N. H. & H. Industries: iron works, two woolen mills, two iron foundries, shirt, straw, and fur hat, lock, paper box, and shoe factories. Surrounding country agricultural. The town was first settled in 1649 and became a city in 1893. Pop. 1900, 6,125.

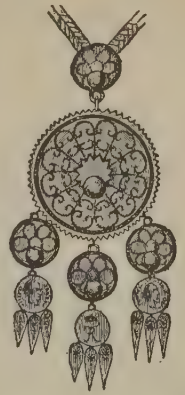
Norwalk, Huron co., O., on west branch of Huron River. Surrounding country agricultural, fruit growing, and farming. Dairy products quite extensive. Railroads: L. S. & M. S.; Wheeling & Lake Erie; and Sandusky, Milan & Norwalk. Industries: railroad machine and repair shops, piano company, flouring mills, foundry and machine works, umbrella works and printing company. The town was first settled about 1810. Population, 1900, 7,074.

Norway (Norwegian, Norge), a country in the north of Europe, bounded on the n.e. by Russian Lapland, and e. by Sweden, and washed on all other sides by the sea—by the Arctic Ocean on the n., the Atlantic and the North Sea on the n.w. and w., and the Skager Rack on the s. It is about 1,080 mi. in length, and its greatest breadth is about 275 mi., but toward the north it narrows so much as to be in some places not more than 20 mi.; area 124,495 sq. mi. Population 1901, 2,231,395. The country is divided into twenty prefectures, of which the capital Christiania forms one, and the city of Bergen another. Other important towns are Trondhjem, Stavanger, and Drammen.

Physical Features.—The coast consists chiefly of bold precipitous cliffs, and is remarkable both for the innumerable islands by which it is lined, and the bays or fiords which cut deeply into it in all directions. The surface is very mountainous, particularly in the west and north. Very commonly the mountain masses assume the form of great plateaux or tablelands, called *fjelds* or *fields*, as the Dovre Fjeld, Hardanger Fjelds, etc. Immense snow fields and glaciers are a feature of Norwegian scenery. The few important rivers that Norway can claim as exclusively her own have a southerly direction, and discharge themselves into the Skager Rack; of these the chief are the Glommen (400 mi.), and its affluent the Lougen. The most important river in the north is the Tana, which forms part of the boundary between Russia and Norway, and falls into the Arctic Ocean. Lofty waterfalls are numerous. Lakes are extremely numerous, but generally small. The principal is the Miösen Vand. The prevailing rocks of Norway are gneiss and mica-slate, of which all the loftier mountains are composed. The most important metals are iron, copper, silver, and cobalt, all of which are worked to a limited extent. The climate of Norway is on the whole severe. The forests are estimated to cover about a fifth of the whole surface, and form a very important branch of national wealth. The principal forest tree is the pine. Only about 1,000 sq. mi. is under the plow. The chief cereal crop is oats. Barley ripens at 70° of latitude; rye is successfully cultivated up to 69°; oats to 68°; but wheat not beyond 64°, and that only in the most favorable seasons. Potatoes are grown

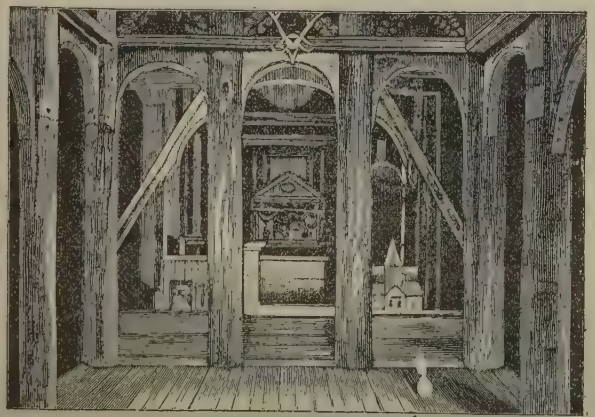
Old costumes.

Mountain cottage.



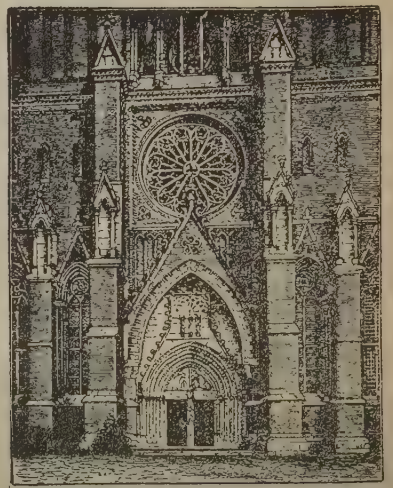
Pendant from necklace.

Cottage.



Interior of same church.

Church.



Entrance to cathedral at Upsala.

with success even in the far north. The farms are generally the property of those who cultivate them, and commonly include a large stretch of mountain pasture, often 40 or 50 mi. from the main farm, to which the cattle are sent for several months in summer. The rearing of cattle is an extensive and profitable branch of rural economy. The horses are vigorous and sure-footed, but of a diminutive size; the ponies are among the best of their kind, and are often exported. The reindeer forms the principal stock in the extreme north. Among the larger wild animals are the wolf, bear, elk, deer. The fisheries of Norway are of very great value; they include the cod, herring, mackerel, salmon, shark, walrus, seal, and lobster, the cod and herring fisheries being by far the most important. Manufactures include cotton, woolen, flax, and silk tissues. Distilleries, brick works, saw and flour mills, are numerous; and there are foundries, machine works, lucifer match works, tobacco factories, and sugar refineries. The export trade includes fish, timber, wood pulp, whale and seal oil, metals, skins, feathers, furs, matches, etc. The chief imports are grain, textile goods, wool, sugar, coffee, tobacco, wine, brandy, petroleum, etc. The chief trade is with Britain and Germany; Sweden, Denmark, and Russia coming next. The Norwegians are famous as sailors, and the country possesses the largest mercantile navy in Europe next to Britain. Bergen, Christiania, and Trondhjem are the chief ports. There are about 1,000 mi. of railway. The monetary system is the same as that of Denmark.

Government, People, etc.—Norway is a limited hereditary monarchy, united with Sweden as a free and independent kingdom. The king is not allowed to nominate any but Norwegian subjects to offices under the crown. On a new succession, the sovereign must be crowned king of Norway, at Trondhjem. The members of the legislative assembly or Storthing are elected every three years by voters who have themselves been elected by the citizens possessing a certain qualification. It subdivides itself into two chambers—one, the Lagthing, consisting of one fourth of the members; the other, the Odelsthing, has the remaining three fourths. The chambers meet separately, and each nominates its own president and secretary. Every bill must originate in the Odelsthing. When carried in that body it is sent to the Lagthing, and thence to the king, whose assent makes it a law. The great body of the people are Protestants of the Lutheran confession, which is the state religion. Other sects are tolerated, although government offices are open only to members of the Established Church. Elementary education is free and compulsory. Besides primary schools, there are numerous secondary schools. There is but one university, that of Christiania. The army is raised mainly by conscription. The nominal period of service is thirteen years, five in the line, four in the *Landvœrn* (liable to be called to defend the country), and four in the *Landstorm* (for local defense). The troops of the line number 18,000. The navy comprises four ironclads, besides other vessels. The revenue amounts to about $12,500,000; the public debt is $13,973,752. The people are almost entirely of Scandinavian origin. A small number of Lapps (called in Norway, Finns) and Qvaens, reckoned at 20,000 in all, dwell in the northern parts. The Norwegian language is radically identical with the Icelandic and with the Danish. For centuries Danish was generally employed as the literary and educated language of the country, as it still is; but during this century a vernacular literature has sprung up, the chief names connected with which are Wergeland, Welhaven, Absjörnsen, Björnson, Ibsen, etc.

History.—In the earliest times Norway was divided among petty kings or chiefs (*jarls*), and its people were notorious for their piratical habits. Harold Fair-hair (who ruled from 863 to 933) succeeded in bringing the whole country under his sway, and was succeeded by his son Eric. He was ultimately driven from the throne, which was seized in 938 by his brother Hako I, who had embraced Christianity in England. Magnus the Good, the son of St. Olaf and Alfhild, an English lady of noble birth, was called to the throne in 1036; and having in 1042 succeeded also to the throne of Denmark, united both under one monarchy. After his death the crowns of Norway and Denmark again passed to different individuals. In 1319 the crowns of Norway and Sweden became for a short time united in the person of Magnus V. Eric of Pomerania succeeded, by separate titles, to Norway, Sweden, and Denmark; and in 1397 was crowned king of the three kingdoms. Sweden then for a time became a separate kingdom; but the union between Denmark and Norway was drawn closer and closer, and very much to the disadvantage of the latter, which was ultimately degraded into a mere dependency of the former. The subsequent history of Norway becomes for a long period merely a part of that of Denmark. After the defeat of Napoleon by the allies in 1813 it was arranged by the Treaty of Vienna in 1814 that Denmark must cede Norway to Sweden, and the result was the union of the two countries under the Swedish crown. The union has not been unaccompanied with a certain amount of friction, partly owing to the entirely democratic character of the constitution of Norway, in which country titles of nobility were abolished early in the present century. The right claimed by the king to veto absolutely bills passed by elected representatives met with an overwhelming protest by the people, the struggle lasting until 1884. In 1891 an election held for members of the Storthing resulted in a majority for the party which advocates the appointment of separate foreign ministers for Sweden and Norway.

Norway Spruce, a tree of the genus *Abies*, *A. excelsa*, which abounds in Norway. It is used for a great variety of purposes in building.

Norwich, Chenango co., N. Y., on Chenango River and canal. Railroads: D. L. &

W., and N. Y. O. & W. Industries: blast furnaces, foundry and machine shops, hammer, carriage, furniture, and leather factories, and silk weaving works. Pop. 1900, 5,766.

Norwich, New London co., Conn., on the Thames river, 95 m. s. w. of Boston. Railroads: Cent. Vt. and N. Y. & N. E. Industries: Norwich makes the finest cotton goods in the world; has also iron foundries, woolen mills, stove, pistol, bicycle, paper, quilt, cutlery, cork and leather belting factories. The town was settled in 1659 and became a city in 1784. Pop. 1900, 17,251.

Norwich (nor'ich), a borough and bishop's see in England, capital of the county of Norfolk, 98 mi. n.n.e. of London. It is a picturesque old town, and with its gardens and orchards covers a large area. The cathedral, founded in 1094, was originally in the Norman style, but now exhibits also later styles. Manufactures, of which worsted and mixed goods are the staple, are extensive, including also mustard and starch, boot and shoemaking, iron-working, brewing, etc. The foundation of Norwich cannot be fixed earlier than 446. Rising to the position of capital of the kingdom of East Anglia, it had, by the middle of the tenth century, become a large and wealthy town; but in 1002 it was laid in ashes by the Danes. Shortly after rebuilt by the Danes themselves, it had become in the eleventh century a large and populous place. In 1296 it began to send representatives to Parliament. In 1328 Edward III made it a staple town for the counties of Norfolk and Suffolk, and induced great numbers of Flemings to settle in it. Pop. 100,964.

Nose, the organ in man and the higher animals exercising the olfactory sense, or that of smell, and concerned through its apertures or passages in the function of respiration and in the production of voice. See *Anatomy.*

Nosology (from the Greek *nosos,* disease), in medicine, that science which treats of the systematic arrangement and classification of diseases, with names and definitions, according to the distinctive character of each class, order, genus, and species. Many systems of nosology have been proposed at different times, but that of Dr. William Farr has been very generally adopted as practically useful. By this system all diseases are classed under the heads of 1. Zymotic Diseases, including fevers and all diseases that may be attributed to the introduction of some ferment or poisonous matter into the system; 2. Constitutional Diseases, as gout, rheumatism, cancer, scrofula, consumption, etc.; 3. Local diseases, as diseases connected with the nerves, circulation, digestion, respiration, urino-genital system, skin, etc.; and 4. Developmental Diseases, as malformations, special diseases of women, diseases connected with childhood or old age, etc.

Nostoc, a genus of green-spored gelatinous algæ, frequent especially in sandy soils and immediately after rain in summer, and vernacularly called *witches' butter, fallen stars,* etc. Many of the species are edible, the *N. Edūle* of China being a favorite ingredient in soup.

Notables, in French history, a body consisting of noblemen, archbishops, high legal functionaries, magistrates of cities, etc., appointed and convoked from time to time by the king, as being a more pliant instrument than the states general. The first assembly of notables of any importance was in 1558. For long there had been no meeting, but the troubles preceding the revolution led to the notables being assembled in 1787. A second meeting was held in November, 1788, to consult on the manner of assembling the states general; but soon after everything was overturned by the revolution.

Not Guilty is the general issue or plea of the accused in a criminal action. When a prisoner has pleaded not guilty he is deemed to have put himself forward for trial and the court may order a jury for the trial of such person accordingly. Should he refuse to plead the court may direct the proper officer to enter a plea of not guilty on his behalf. In England and the U. S. a jury can only give a verdict either of guilty or not guilty.

No'tochord, in animal physiology, a fibro-cellular rod which is developed in the embryo of vertebrates immediately beneath the spinal cord. It is persistent in the lower vertebrates, but in the higher is replaced in the adult by the vertebræ, which are developed in its surrounding sheath. It is often spoken of as the *chorda dorsālis.*

Notor'nis, a genus of grallatorial or wading birds, found inhabiting the South Island of New Zealand. It was first known to science by the discovery of fossil remains; but subsequently the genus was found to be still represented by living forms. The notornis is most nearly allied to the coots. It is, however, of larger size than these birds, and differs from them in the rudimentary nature of the wings.

Notre Dame (nō-tr dâm) (French, "Our Lady"), a title of the Virgin Mary, is the name of many churches in France, and particularly of the great cathedral at Paris, which was founded in the twelfth century, and forms a prominent object in the city.

Notre Dame Du Lac, UNIVERSITY OF, a Roman Catholic institution of higher learning founded at Notre Dame, Indiana, in 1842. It comprises a school of liberal arts, with a large preparatory department, and departments of engineering, pharmacy, agriculture and law. There are branches of this institution at Austin, Tex., New Orleans, La., and Portland, Oregon. The university proper at Notre Dame has a faculty of 60, an attendance of 800 students and a library containing over 60,000 volumes. The president of the university is A. Morissey, C. S. C.

Nottingham, a town near the middle of England, capital of the county of same name, 110 mi. n.w. of London. The principal educational and literary institutions are the University College and Technical School, high school for boys, the Blue-coat School, the school of art, the People's Hall, and the Mechanics' Institute. The staple manufactures

are hosiery, and lace, the latter being a sort of specialty. There are also manufactures of cotton, woolen, and silk goods, and of articles in malleable and cast iron. Nottingham was a place of importance in Anglo-Saxon times, and was twice or thrice taken by the Danes. Charles I raised his standard here in 1642, and the next year the town and castle were taken by the Parliamentarians. Serious riots, occasioned by the introduction of machinery, took place in 1811–12 and 1816–17. Pop. 211,984. NOTTINGHAMSHIRE, also called NOTTS, is an inland county. Area 526,176 acres. The manufactures include lace, hosiery, machinery, silk and cotton spinning, bleaching, coal mining, iron and brass founding, glove making, etc. Pop. 445,599.

Nouméa (nö-mā'à) (also called Port de France) is the chief settlement in the French penal colony New Caledonia (which see). Pop., besides convicts and soldiers, about 5,000.

Noun (from the Latin *nomen*, name), in grammar, a word that denotes any object of which we speak, whether that object be animate or inanimate, material or immaterial. Nouns are called *proper* or *meaningless* when they are the names of individual persons or things, as George, Berlin, Orion; *common*, when they are the name of a class of things, as book, page, ball, idea, emotion; *collective*, when they are the names of aggregates, as fleet, army, flock, covey, herd; *material*, when they are the names of materials or substances, as gold, snow, water; *abstract*, when they are the names of qualities, as beauty, virtue, grace, energy. Some of the older grammarians included both the noun and the adjective under the term *noun*, distinguishing the former as *noun substantive* and the latter as *noun adjective*.

Nova Scotia, a province of the Dominion of Canada, consisting of a peninsula or portion properly called Nova Scotia, and the Island of Cape Breton, which is separated from the mainland by the Strait or Gut of Canso. It is bounded on the n. by Northumberland Strait and the Gulf of St. Lawrence; n.e., s., and s.e. by the Atlantic; w. by the Bay of Fundy; and n. by New Brunswick, with which it is connected by an isthmus only 11 mi. broad (traversed by a ship railway); area 20,907 sq. mi., or over 13,000,000 acres. Of the whole about 5,000,000 acres are fit for tillage. The southeastern coast is remarkable for the number and capacity of its harbors. There are no mountains of magnitude, but ranges of hills traverse the peninsula on the northwest side. There are a great number of lakes, but no streams of great size. The forests are extensive and valuable. The climate is the most equable in Canada. The wild animals include bear, foxes, moose, caribou, otter, mink, etc., and excellent sport may be had. The minerals are also valuable. Granite, trap, and clay-slate rocks predominate. Coal, with iron in combination, abounds in many places, and more than 1,500,000 tons is raised annually. Gold is also found, and is being worked. Copper ore exists, as also does silver, lead, and tin; and gypsum is plentiful. Petroleum has been recently discovered, and wells have been sunk in Cape Breton. Wheat, potatoes, and oats are important crops; and buckwheat, rye, barley, Indian corn, and field peas are extensively cultivated. Great quantities of hay are made, and a good deal is exported. The apple orchards of the western counties are very productive, and extend along the highway in an unbroken line for 30 mi. Apples are now largely exported. Cattle and sheep are raised in considerable numbers, and are exported both to New Brunswick and Newfoundland. There are extensive fisheries of cod, haddock, mackerel, herrings, etc. The manufactures are comparatively unimportant, but a good deal of capital is invested in sawmills, flour mills, shipbuilding, tanning, etc. The foreign trade is comparatively large, more shipping being owned in proportion to population than in any other country. The imports consist principally of British and American manufactures; spirits, sugar, wines, coffee, etc. The principal articles of export are fish, timber, and coal. Education is widely and equally diffused and is free to all classes. There are four degree-conferring colleges or universities. The public affairs of the colony are administered by a lieutenant governor, council, and house of assembly. It sends twelve members to the Senate and eighteen to the House of Commons of the Dominion Parliament. The laws are dispensed by a supreme court and district courts as in Canada. Halifax, the capital, possesses one of the finest harbors in America. The province is well provided with railways.

Nova Scotia was first visited by the Cabots in 1497, but was not colonized by Europeans till 1604, when French settlements were made at Port Royal, St. Croix, etc. Under the French Nova Scotia (with New Brunswick) was known as Acadia or Acadie. The French colonists were more than once almost entirely driven out by the English. In 1621 Sir William Alexander obtained from James I a grant of the country, but his attempt to colonize it proved a failure. In 1654 Cromwell took possession of the country, which remained with the English till 1667, when it was ceded to France; but in 1713 the country was again ceded to England. In 1755 the French colonists were almost all forced to leave the country owing to their hostility to the English. In 1763 the Island of Cape Breton was annexed to Nova Scotia, but was separated in 1784–1820. In 1784 New Brunswick was detached. In 1867 the province became a member of the Dominion of Canada. Pop. 1901, 459,116.

Nova Zembla (Russian, *Novaia Zemlia*) two large islands in the Arctic Ocean, belonging to Russia, and lying north from the northeastern corner of European Russia, separated from each other by the narrow strait Matotchk in Shar; length 635 mi.; breadth 170 mi. The coasts swarm with seals, fish, and water fowl. The interior is covered with stunted shrubs, short grass, and moss, and is frequented by reindeer, white bears, ermines, and Arctic foxes. It has no permanent inhabitants, but is visited by Russian hunters and fishers.

Novel

Novel, a prose narrative, involving portraitures of character and descriptions of scenery, written with a moral purpose wrought out by a definite plot. In this broad sense, the term includes the "romance," but in modern times the latter is distinguished from the novel by its ideal, marvelous, mysterious subjects and situations. The form of fiction now known as "novel" is of great antiquity. Ancient Egypt furnished several instances of crude attempts along this line. An Indian author produced *Adventures of the Ten Princes* in the sixth century, similar in character to the *Arabian Nights*, which had appeared previously in Arabia. China and Japan both had large contributions to fiction at an early date. Among the Greeks and Romans novels were produced in small numbers, the first product of the Greeks being the *Milesian Tales*. The most famous Greek name in this connection is Heliodorus (about 400 A D.). Of the Romans the most notable are Petronius Arbiter and Appuleius. Fiction during the middle ages took the form of the metrical romance, such as the *Canterbury Tales* of Chaucer. The first novel, using the term in the modern sense, appeared in the *Decameron* of Boccaccio (about 1353), which furnished the model for innumerable works during many years, notably the *Heptameron of Margaret of Navarre* (1559). During the sixteenth and seventeenth centuries the growing cosmopolitanism of Europe and the consequent advent of new modes of thought and expression from the East, gave an impetus to novel writing such as it had never before felt. In every language fiction was produced by all the great authors of the time. In England was Caxton, who, as early as 1475, had produced numerous romances. *Morte d'Arthur* (1485) by Sir Thomas Mallory marked a distinct advance. In 1515 appeared Thomas More's *Utopia*, a dream of an ideal socialistic state. To Spain is due much credit for the development of the structural forms of the novel. *Amadis of Gaul* by De Montalvo (1470) is among the first prose romances in modern form. To this period in Spain belong also the "*picaresque*" or rogue stories. Rabelais's *Garagantua* marks the progress of the movement in France. Italy produced the *Vita di Bartaldo;* Sir Philip Sidney's *Arcadia* in England, and the famous *Don Quixote* of Cervantes in Spain, completed the history of the novel up to the opening of the seventeenth century.

The names of Bunyan and Defoe, whose *Pilgrim's Progress* and *Robinson Crusoe* (1719), respectively, still are classics of their kind, are sufficient evidence of the change which had overtaken novel writing at this time. The school of Richardson, Fielding and Smollett, particularly the two first named, perfected the dramatic, realistic and comic elements, which became essential parts of all future novels of importance. Le Sage, with *Gil Blas*, opened the new era in France; Swift's *Gulliver's Travels*, Goldsmith's *Vicar of Wakefield*, Marivaux's *Vie de Marianne*, Rousseau's *Emile*, Voltaire's *Princesse de Babylone*, and the works of the great German trio, Wieland, Jean Richter and Goethe, were preparing the way for the nineteenth century period. Richter with delicate humor, pathos and fancy, and Goethe with semi-philosophic themes and complete mastery of form, were evidently strong forces in the perfection of the modern novel.

The nineteenth century opens with a truly great name, Sir Walter Scott. He in truth created the historic novel, and established its forms so definitely and perfectly that little progress has since been made. He lent a great impetus to English novel writing, as a long list of later writers testifies. Among these were Jane Austen, Lever, Mrs. Gore, Hook, Disraeli, Bulwer-Lytton, Dickens, Thackeray, James, the sisters Bronté, Anthony Trollope, Kingsley, Marryat, George Eliot, Wilkie Collins, Mrs. Oliphant, Miss Yonge, Hughes, Reade, Black, Hardy, Blackmore, Besant, Rider Haggard, R. L. Stevenson, George Meredith and Dr. George Macdonald.

In America, the novel, like other forms of literature, was slow in developing and received little attention until well on in the nineteenth century. Charles Brockden Brown was the first notable adventurer in the field, his *Wieland* (1797) and *Clara Howard* being weak attempts at realistic novels. James Fenimore Cooper was also a pioneer, but soon established a reputation as a master of interesting adventure, earning the title, "The American Scott," by his thrilling sea and Indian tales, beginning with the *Pilot* (1824). Washington Irving tried his hand at novel writing and won recognition, though his works have many limitations, being notable chiefly for humorous incidents and the portrayal of odd characters, particularly the New York Dutch settlers. With Poe, American fiction reached its first great height, for his weird tales, replete with mystery and strange psychological phenomena, told with a peculiar power and realism, still rank as among the best of their kind. Notable among them are *The Fall of the House of Usher*, and *The Masque of the Red Death.* Poe had a worthy successor in Nathaniel Hawthorne, by whom American romance was brought to its greatest perfection, and who ranks, in the conception of plot, the portrayal of character, and artistic execution, with the greatest novelists of his time. His novels were psychological studies of the character and conduct of peculiarly human and natural persons. After him came Harriet Beecher Stowe with *Uncle Tom's Cabin*, then Oliver Wendell Holmes, followed by such writers as Bret Harte, the portrayer of western life; Henry James, delighting in intricate, psychological subjects; Julian Hawthorne; George W. Cable, who depicts the typical South; F. Marion Crawford, a master of realistic and dramatic action; W. D. Howells, writing of American types and life; Elizabeth Stuart Phelps and Sarah Orne Jewett, of New England; Mark Twain, of the Mississippi valley; Owen Wister, Hamlin Garland of the West; Thomas Nelson Page and Joel Chandler Harris of the South; Ernest Thompson-Seton of animal life; S. Weir Mitchell, Winston Churchill

and a host of others in the field of historical fiction. Of this last class of works recent years have seen an innumerable quantity, but few of which are probably destined to live. American political life and modern society and social conditions are gradually replacing the historical theme in popularity.

Of modern English novelists the most important are Mrs. Humphrey Ward, J. M. Barrie, John Watson, Anthony Hope; of the French, Daudet, Maupassant, Zola, Hugo, Châteaubriand, Madame de Staël, Dumas (father and son), Balzac, Sand, Mérimeé and About are the most celebrated. Gutzkow, Alexis, Kinkel, Auerbach, Freytag, Heyse, Ebers and Rosegger are the most noteworthy names in the German group of novelists. Manzoni for Italy, Hans Christian Andersen for Denmark, Bremer and Carlen for Sweden and Björnsen for Norway, Jokai for Hungary, Tourguenieff and Tolstoi for Russia, stand as the leading representatives of the fiction-writers of other modern nations. Twentieth century fiction bids fair to rival in numbers that of the Victorian Era, but few masterpieces are yet visible among the throng.

Novels, in the civil law, are the supplementary constitutions of some Roman emperors, so called because they appeared after the authentic publications of law made by these emperors.

Novem'ber (from L. *novem*, nine), formerly the ninth month of the year, but according to the Julian arrangement, in which the year begins on January 1, November became the eleventh month, and comprised 30 days.

Nov'gorod (or Veliki-Novgorod) (*Great Novgorod*), a town of Russia, capital of the government of same name, on the Volkhov, near the point where it issues from Lake Ilmen, 103 mi. s.s.e. St. Petersburg. It was during the Middle Ages the largest and most important town of Northern Europe. Novgorod was the cradle of the Russian monarchy, and a monument was erected in 1864 to commemorate the thousandth anniversary of the foundation of the Russian state by Rurik. The trade and manufactures are now unimportant. Pop. 20,599. The government has an area of 47,236 sq. mi. A great part of the surface is covered by forests. The principal crops are rye, barley, oats, flax, and hemp. Pop. 1,194,078.

Novi-Bazar', a town of Bosnia, on the Rashka, a tributary of the Morava, 130 mi. s.e. of Bosna-Serai. It has important fairs, and is in a position of strategic importance. Pop. 12,000.

Novice, a candidate of either sex for a religious order; the *novitiate* being the time in which the novice makes trial of a monastic life before taking the final vows. The term of probation is at least one year, and may extend to two or three. The order is not bound to receive a novice at the end of his novitiate, neither can a novice be hindered from leaving the order when the term of novitiate is expired. The age for commencing a monastic life is fixed by the Council of Trent at sixteen years.

Novo-Tcherkask' ("New Tcherkask"), the chief town of the country of the Don Cossacks, in Southern Russia, on the Aksai, a tributary of the Don, 40 mi. from the Sea of Azov. It was founded in 1805, when the inhabitants had to remove from Old Tcherkask, on the banks of the Don, on account of inundations. It is a thriving place with a considerable trade, but the manufactures are unimportant. Pop. 37,091.

Novum Or'ganum ("new instrument"), the second part of Bacon's great projected work, the *Instauratio Magna*, published in 1620. It is written in Latin, and along with the *Advancement of Learning* forms the foundation of the inductive or Baconian system of philosophy.

Noyades (nwä-yäd) (French, from *noyer*, to drown), the name given to the execution of political prisoners by drowning them, practised during the French Revolution, especially by Carrier at Nantes. One method adopted was crowding the victims into a boat, withdrawing a plug in the bottom, and casting them adrift.

Noyau (nwä-yō'), a cordial or liquor of various compositions, but generally prepared from white brandy, bitter almonds, sugar candy, grated nutmeg and mace, and sometimes further flavored with orange peel, the kernels of apricots, peaches, nectarines, etc.

Nubia, a name given, in a more or less restricted sense, to the countries of Northeastern Africa bounded n. by Egypt, e. by the Red Sea, s. by Abyssinia, Senaar, and Kordofan, and w. by the Libyan Desert. With the exception of the Valley of the Nile the country is generally desert. From 1822 to the revolt of the Mahdi in 1883 the country was subject to Egypt. It now, with Senaar, Kordofan, and other districts, acknowledges the sway of the Mahdi's successor. Suakin, or Sauakin, on the Red Sea is the only practicable port. The Nubians belong to the Arabian and Ethiopian races, who converge in the Nile basin; they are a handsome race, of dark-brown complexion, bold, frank, cheerful, and more simple and incorrupt in manners than their neighbors either up or down the river. Their language is various dialects of the negro speech of Kordofan. Previous to the rebellion a great transit trade was carried on between Egypt and the interior of Africa by the Nubians. Pop. est. at 1,000,000 or 1,500,000. The country is still in a disturbed state.

Ñuble (nyö'blā), an inland prov. of Chile, watered by the Ñuble and other streams; area 3,555 sq. mi.; pop. 149,871.

Nucha (or Nukha) (nö-*h*ä'), a town of Russia, in the Caucasian government of Elizabethpol, 120 mi. e.s.e. from Tiflis. It contains a fortress and palace built by Hosein Khan in 1765, and was up to 1864 a very important sericultural center. Pop. 30,917.

Nudibranchiata, the section of "Naked-gilled" mollusks belonging to the class of Gasteropods. They have no shells in their adult state, and the gills are completely exposed, existing for the most part as branched or aborescent structures on the back or sides of the body. The sea lemons, sea slugs, etc., are examples.

Nuisance.—Any reckless or inconsiderate use of one's liberty or property, which without destroying the substance of other property impairs its use and enjoyment, below the degree of comfort and convenience deemed essential for that particular kind of property by the general sense of the community. Nuisances are defined as of two kinds—*public* or *common* and *private*. Public nuisances are: annoyances in the highways, bridges, and public rivers; injurious and offensive trades and manufactures, which, when hurtful to individuals, are actionable, and when detrimental to public health or convenience, punishable by public prosecution, and subject to fine according to the nature of the offense. A private nuisance may be defined as an injury or annoyance to the person or property of an individual, and not amounting to a trespass; as where one projects the eaves of his house over those of his neighbor, or stops or obstructs a right of way. Whatever obstructs passage along the public ways, or whatever is intolerably offensive to individuals in their homes, constitutes a nuisance. Causing inconvenience to one's neighbors may not in itself be a nuisance at law; there must be positive discomfort or danger. It is a nuisance if a neighbor sets up and exercises any offensive trade, or keeps noisome animals near the house of another. Nuisance, whether private or public, is rather a tortious than a criminal act. The remedy at law for the injury of nuisance is by action of trespass on the cause, in which the party injured may recover a satisfaction in damages for the injury sustained. The party aggrieved has also the right to abate the nuisance by his own act; that is, he may take away or remove it, provided he commits no riot in so doing, nor occasions (in cases of private nuisance) any damage beyond what the removal of the inconvenience necessarily requires. Says Blackstone: "The reason the law allows this summary method is because injuries of this kind require an immediate remedy, and cannot wait for the slow progress of justice."

Nullification, a rendering void and of no effect, or of no legal effect, in U. S. politics the doctrine of the extreme states' rights party, first propounded by Calhoun in 1828. He asserted the right of any state to declare the unconstitutionality of any federal law, and the right to withdraw from the Union should such law be enforced. This controversy, though silenced at the time, ended in the secession of the Confederate states and the Civil War.

Nul'lipore, a name given to certain beautiful little plants of the genus *Melobesia*, common on coral islands. From secreting lime on their surface, and hence resembling coral, they were formerly supposed to be a kind of zoophytes.

Numantia, an ancient town of Spain, the site of which is near the town of Soria in Old Castile. It had great natural strength, and is celebrated for its desperate resistance to the Roman power, especially in the siege by Scipio Africanus in B. C. 134-133, when it had to surrender, though most of its defenders then surviving put themselves to a voluntary death. The town was destroyed by the conqueror.

Numa Pompilius, the second king of Rome, who is said to have reigned from 714 to 672 B. C. He was of Sabine origin, and was distinguished as a philosopher and legislator, though, like the other early kings, he has more a legendary than a historical existence. He was regarded as the founder of the most important religious institutions of the Romans, and left writings explanatory of his system, which were burned by order of the senate when accidentally discovered 400 years after his time.

Number, a single unit considered as part of a series, or two or more of such units. An *abstract number* is a unit or assemblage of units considered independently of any thing or things that they might otherwise be supposed to represent. For example, 5 is an *abstract number* while it remains independent; but if we say 5 feet or 5 miles it becomes a *concrete number*. *Cardinal numbers* are numbers which answer the question, "How many?" as one, two, three, etc., in distinction from *first*, *second*, *third*, etc., which are called *ordinal numbers*. A *prime number* is a number which can be divided exactly by no number except itself and unity. A number is *even* when it is divisible by two, otherwise it is *odd*.

Number, in grammar, that distinctive form which a word assumes according as it is spoken of or expresses one individual or several individuals. The form which denotes one or an individual is the *singular number;* the form that is set apart for two individuals (as in Greek and Sanskrit) is the *dual number;* while that which refers indifferently to two or more individuals or units constitutes the *plural number*.

Numbering Machine, a machine for impressing consecutive numbers on account books, coupons, railway tickets, bank notes, etc. One of the principal forms of the apparatus consists of disks or wheels decimally numbered on their peripheries, the whole mounted on one axle, upon which they turn freely, acting upon each other in serial order. The first wheel of the series, containing the units, is moved one figure between each impact, and when the units are exhausted the tens come into action and act in coincidence with the units, so on of the hundreds, thousands, etc.

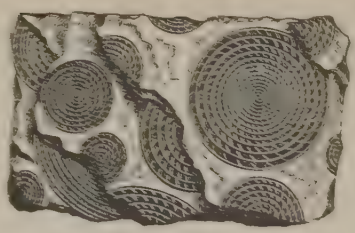
Numbers, Book of, the fourth of the books of the Pentateuch. It takes its name from the records which it contains of the two enumerations of the Israelites, the first given in chaps. 1–4, and the second in chap. 26. It contains a narrative of the journeyings of the Israelites from the time of their leaving Sinai to their arrival at the plains of Moab, and portions of the Mosaic law. Formerly the authorship was implicitly attributed to Moses, but some modern scholars resolve the book into various parts, to each of which is assigned a separate author.

Numid'ia, an ancient country of North Africa, corresponding roughly with modern Algeria. It was divided among various tribes,

but after the Second Punic War it was united under Massinissa, and several of its rulers became noted in Roman history. In B. C. 46 it became a Roman province.

Numismatics (or Numismatology), the science of coins and medals, the study of which forms a valuable and important adjunct to that of history. The word *coin* is in modern times applied to those pieces of metal struck for the purpose of circulation as money; while the word *medal* signifies pieces of metal similar to coins not intended for circulation as money, but struck and distributed in commemoration of some person or event. Ancient coins, however, are often termed *medals*. They are gold, silver, bronze, electrum, or billon, and in ancient times served not only the purposes of a currency, but as chroniclers of political events, and abstracts of the times. It is also from coins alone that we derive our knowledge of some of the most celebrated works of ancient art, particularly of ancient statuary. The parts of a coin or medal are: the *obverse* or *face*, containing generally the head, bust, or figure of the sovereign or person in whose honor the medal was struck, or some emblematic figure relating to him; and the *reverse*, containing various figures or words. The words around the border form the *legend*, those in the middle or field the *inscription*. The lower part of the coin, separated by a line from the figures or the inscription, is the *basis* or *exergue*, and contains the date, the place where the coin was struck, etc. Coins are usually arranged in three grand classes: Greek and Roman coins, mediæval and modern European coins, and Oriental coins. Greek coins are again classified in three divisions: 1, civic coins, and regal without portraits; 2, regal coins bearing portraits; 3, Græco-Roman coins. Roman coins are divided into 1, republican; 2, imperial. In ancient, as in modern times, while the coins of empires or kingdoms were (at least in later times) distinguished by the head of the reigning prince, those of free states were distinguished by some symbol. Thus, Egypt was distinguished by a sistrum, an ibis, a crocodile, or a hippopotamus. There were also a number of symbols having a general signification. Thus, a patera signified a libation, and indicated the divine character of the person holding it in his hand; the shaft of a spear denoted sovereign power; an ensign on an altar, denoted a new Roman colony, etc. Mediæval coins include the Byzantine, the coins of the various European states from the fall of Rome to the accession of Charlemagne; the Carlovingian currency from Charlemagne to the fall of the Swabian house (1268); the early Renaissance to 1450; and the classical Renaissance from then till 1600. Modern coins are classed geographically and chronologically. Oriental coins are those of Ancient Persia, Arabia, Modern Persia, India, China, etc.

Nummulite (Latin *nummus*, money; Greek, *lithos*, stone), a name common to the members of an extensive class of fossil polythalamous foraminifera, having externally somewhat the appearance of a piece of money (hence their name), without any apparent opening, and internally a spiral cavity divided by partitions into numerous chambers communicating with each other by means of small openings. They vary in size from less than ⅛ in. to 1¼ in. or more in diameter. Nummulites occupy an important place in geology, on account of the prodigious extent to which they are accumulated in the lower tertiary (Eocene) strata. They are often piled on each other nearly in as close contact as the grains in a heap of corn. They occur so abundantly in some parts of the Eocene formation that the name of *nummulitic* limestone is given to the strata so characterized. This series is characteristic of the Old World, often attains a thickness of many thousand feet, and extends from the western shores of Europe and Africa through Asia to the east of China. The pyramids of Egypt are constructed of a stone largely composed of nummulites.



Nummulites.

Nun, a word of unknown origin, but supposed to be connected with a Coptic word signifying "pure," applied in the Roman Catholic Church to a female who retires from the world, joins a religious sisterhood, takes upon herself the vow of chastity and the other vows required by the discipline of her convent, and consecrates herself to a life of religious devotion. Nearly all the masculine orders or rules had corresponding feminine institutions while there were also numerous independent orders of nuns. At present the number of nuns is largely in excess of that of monks. The first nunnery is said to have been that founded by a sister of St. Anthony about A. D. 250; and the first in England was founded at Folkstone by Eadbald, king of Kent, in 630.

Nunc Dimittis ("now thou lettest depart"), the first two words of the Latin version of the canticle of Simeon given in Luke 2 : 29–32, and used as the designation of the whole canticle, which forms part of the evening service in the *Book of Common Prayer*.

Nuncio, an ambassador of the first rank (not a cardinal) representing the pope at the court of a sovereign entitled to that distinction. A papal ambassador of the first rank, who is at the same time a cardinal, is called a legate. The title of *internuncio* is given to an ambassador of inferior rank, who represents the pope at minor courts. Formerly the papal nuncios exercised the supreme spiritual jurisdiction in their respective districts. But now, in these Catholic kingdoms and states which hold themselves independent of the court of Rome in matters of discipline, the nuncio is simply an ambassador.

Nun'cupative Will, one made by the verbal declaration of the testator, and depending merely on oral testimony for proof, though afterward reduced to writing. Nuncupative wills are now abolished, but with a proviso that any soldier in active military service, or any mariner or seaman at sea, may dispose of his personal state by an oral testament before a sufficient number of witnesses.

Nuremburg (nu'rem berg) (Ger. *Nürnberg*, nürn'ber*h*), a town in Bavaria, 93 mi. n. n. w. of Munich. It is surrounded by well preserved ancient walls having numerous massive towers and gateways, and the whole enclosed by a dry moat. The Pegnitz traversing the town from east to west divides it into two nearly equal parts—the north and the south—which communicate by numerous bridges. It contains a large market place. Nuremburg has extensive breweries, railway carriage and lead pencil manufactories, and produces fancy articles in metal, carved wood, ivory, etc., toys, chemicals, clocks and watches, cigars, playing cards, etc. Printing and bookbinding are also extensively carried on, and the hop market is the most important on the Continent. The town is celebrated, in connection with its industry, for the invention of watches. It was an independent imperial town down to 1806, when it became a Bavarian city. It was one of the first of the imperial towns to cast its lot for the Reformation. During the Thirty Years' War about 10,000 of the inhabitants perished, while Gustavus Adolphus was besieged here by Wallenstein (1632). Before the discovery of the sea passage to India, Nuremburg was the great mart of the produce of the East coming from Italy and going to the North. Several causes led to a decline; but since it became a Bavarian city it has prospered greatly, and is now the most important seat of trade and manufactures in South Germany. Pop. 142,403.

Nurse, one who tends or takes care of the young, sick, or infirm; specifically, a female hospital attendant. There are now numerous institutions where active, intelligent, and physically able women are thoroughly trained for this work. The system of sending trained nurses to the seat of war originated with Miss Florence Nightingale during the Crimean War, and organizations for military nursing during war are now common to all civilized countries.

Nursery, a place where vegetables, flowering plants, and trees are raised from seed in order to be sold in their young state either for use as food or for transplantation. The advantage of having separate places devoted to this purpose consists in this that more attention can in that case be given to the objects of culture at the time when particular care is required by them. In the case of trees there is another great advantage in the fact that they can be selected from the nursery at a stage of their growth at which it can be pretty satisfactorily determined that they are likely to thrive. Nurseries are parceled out into several plots according to the different kinds of plants or trees to be raised. One part is assigned to the ordinary culinary vegetables; others to flowering plants requiring different kinds of soil; another to forest trees with caducous leaves; another to ornamental trees and shrubs with caducous leaves; another to trees and shrubs with persistent leaves; and another to fruit trees. For the propagation of many exotic and other trees and plants a large extent of ground in a well appointed nursery is under glass. Sometimes also different parts of the nursery are allotted to the various operations, such as budding and grafting, by which trees are propagated.

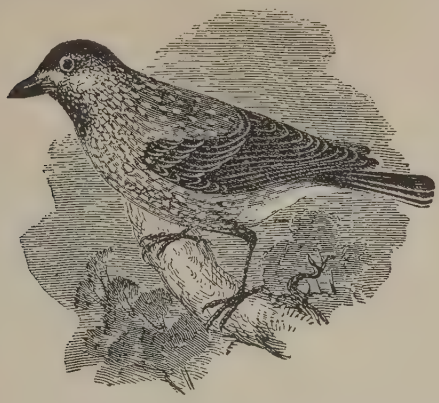
Nut, in botany, a one-celled fruit containing when mature only one seed, and enveloped by a pericarp of hard, woody, or leathery texture, rarely opening spontaneously when ripe. Among the best known and most valuable nuts are the hazelnut, the Brazilnut, the walnut, chestnut, and cocoanut, all of which are edible. Various other kinds of nuts are used for special purposes Thus valonia nuts, gallnuts (not, strictly speaking, nuts), and myrobalan nuts are used in tanning and dyeing, the last two also in ink making; betel nuts in making tooth powder and tooth paste; and coquilla nuts and vegetable ivory (the kernel of the nut of the Peruvian palm), being very hard and capable of taking on a fine polish, are used in making small ornamental articles of turnery.

Nutation, in astronomy, a small subordinate gyratory movement of the earth's axis, in virtue of which, if it subsisted alone, the pole would describe among the stars, in a period of about nineteen years, a minute ellipse, having its longer axis directed toward the pole of the ecliptic, and the shorter, of course, at right angles to it. The consequence of this real motion of the pole is an apparent approach and recess of all the stars in the heavens to the pole in the same period; and the same cause will give rise to a small alternate advance and recess of the equinoctial points, by which, in the same period, both the longitudes and right ascensions of the stars will be also alternately increased or diminished. This nutation, however, is combined with another motion, viz., the precession of the equinoxes, and in virtue of the two motions the path which the pole describes is neither an ellipse nor a circle, but a gently undulating ring; and these undulations constitute each of them a nutation of the earth's axes. Both these motions and their combined effect arise from the same physical cause, viz., the action of the sun and moon upon the earth.

Nut'cracker, the name of an insessorial bird rarely seen in Britain. It is generally referred to the crow family, and so placed as to approximate either to the woodpeckers or starlings. The European nutcracker is about the size of the jackdaw, but with a longer tail. It combines to a considerable extent the habits of the woodpecker and those of the omnivorous birds. It has received the name of nutcracker from its feeding upon nuts. The *N. columbiana*, noted for the diversified beauty of its plumage, frequents rivers and sea shores in America.

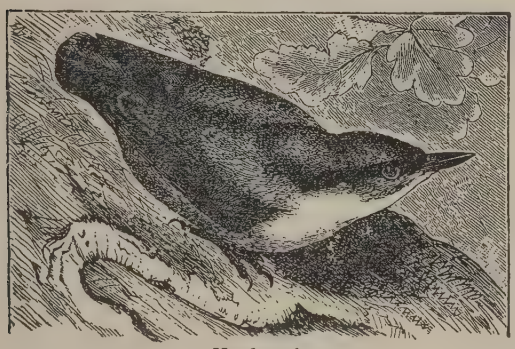
Nut'hatch, the common name of birds of

the genus *Sitta*. The common European nuthatch is a scansorial bird, of shy and solitary



Nutcracker.

habits, frequenting woods and feeding on insects chiefly. It also eats the kernel of the hazelnut, breaking the shell with great dexter-



Nuthatch.

ity. The white-bellied nuthatch of North America is 6 in. long, the wings 4 in.

Nutmeg, the kernel of the fruit of *Myristica moschāta* or *fragrans*. This fruit is a nearly

Nutmeg *a.*— fruit bursting open; *b.*— the same with one valve removed, showing the seed; *c.*— section of seed: *d.*— seed with the testa removed (Bently & Trimen).

spherical drupe of the size and somewhat of the shape of a small pear. The fleshy part is of a yellowish color without, almost white within, and 4 or 5 lines in thickness, and opens into two nearly equal longitudinal valves, presenting to view the nut surrounded by its arillus, known to us as *mace*. The nut is oval, the shell very hard and dark brown. This immediately envelopes the kernel, which is the nutmeg as commonly sold in the shops. The tree producing this fruit grows principally in the islands of Banda in the East Indies, and has been introduced into Sumatra, India, Brazil, and the West Indies. It reaches the height of 20 or 30 ft., producing numerous branches. The color of the bark of the trunk is a reddish-brown; that of the young branches a bright green. The nutmeg is an aromatic, stimulating in its nature, and possessing narcotic properties, very grateful to the taste and smell, and much used in cookery. Nutmegs yield by distillation with water about 6 per cent. of a transparent oil having a specific gravity .948, an odor of nutmeg, and a burning, aromatic taste.

Nu'tria, the commercial name for the skins of the coypou of South America. The overhair is coarse; the fur, which is used chiefly for hat making, is soft, fine, and of a brownish-ash color.

Nutrition, the act or process by which organisms, whether vegetable or animal, are able to absorb into their system their proper food, thus promoting their growth or repairing the waste of their tissues. It is the function by which the nutritive matter already elaborated by the various organic actions loses its own nature, and assumes that of the different living tissues — a process by which the various parts of an organism either increase in size from additions made to already formed parts, or by which the various parts are maintained in the same general conditions of form, size, and composition which they have already by development and growth attained. It involves and comprehends all those acts and processes which are devoted to the repair of bodily waste, and to the maintenance of the growth and vigor of all living tissues.

Nux Vomica, the fruit of a species of *Strychnos*, growing in various places in the East Indies. It is about the size and shape of a small orange, and has a very bitter acrid taste. It is known as a very virulent poison, and is remarkable for containing the vegeto-alkali *strychnia* See *Strychnine*.

Nyas'sa, a large lake in Southeastern Africa, out of which flows the Shiré, a northern tributary of the Zambesi; discovered by Livingstone in 1859. The length of the lake is above 300 mi., and it varies in breadth from about 15 to more than 50 mi. The surface is 1,522 ft. above the sea level; its waters are sweet and abound in fish. There are missionary stations and trading stations in this region, and a road has been constructed between Nyassa and Tanganyika. Recently trade and missionary enterprise have been much disturbed by the proceedings of the Arab slave hunters.

Nyack, Rockland co., on Hudson River, 28 mi. n. of New York. Railroads: Erie; N. Y. L. E. O. & W.; and West Shore. Industries: large shoe factory, iron foundry, bicycle, and shipbuilding. Surrounding country agricul-

tural. The town was first settled in 1790. Pop. 1900, 4,275.

Nyctagina'ceæ (Nyctagin'eæ), a nat. ord. of plants inhabiting the warmer parts of the

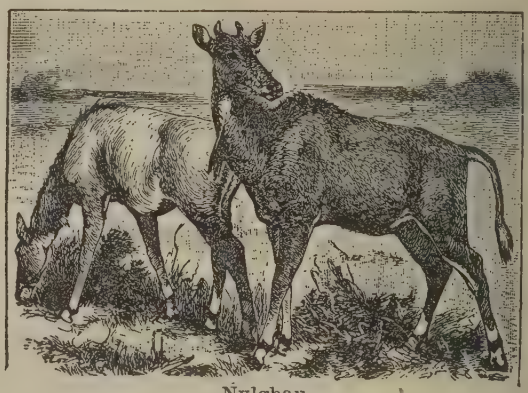
Nux Vomica, branch with flowers.
a.—fruit; *b.*—section of fruit.

world, typical genera of which are the *Mirabilis* or marvel of Peru. The roots of many of the species are fleshy, purgative, and emetic.

Nyctipithe'cus, a genus of American monkeys which appear to represent the lemur tribe in America. Their habits are nocturnal and their movements cat-like.

Nyiregyhaza (nyē'red-yä-zȧ), a town of Hungary, 30 mi. n. of Debreczin. There are mineral springs in the neighborhood, and it has salt, soda, and saltpeter manufactories. Pop. 24,102.

Nylghau (the *Portax picta* or *tragocamēlus*), a species of antelope as large or larger than a stag, inhabiting the forests of Northern India, Persia, etc. The horns are short and bent forward; there is a beard under the middle of the neck; the hair is grayish blue. The female has no horns. The nylghau is much hunted as one of the noblest beasts of the chase, the skin of the bull being in demand for the manufacture of native shields. The name nylghau literally means "blue ox," and has, doubtless,



Nylghau.

been applied to this animal from the ox-like proportions of its body. They are known to breed freely in confinement.

Nymph, a term sometimes applied to denote the *pupa* or *chrysalis* stage in the metamorphosis of insects and other animals.

Nymphs, in mythology, a numerous class of inferior divinities, imagined as beautiful maidens, not immortal, but always young, who were considered as tutelary spirits not only of certain localities, but also of certain races and families. They occur generally in connection with some other divinity of higher rank, and they were believed to be possessed of the gift of prophecy and of poetical inspiration. Those who presided over rivers, brooks, and springs were called *Naiads;* those over mountains, *Oreads;* those over woods and trees, *Dryads* and *Hammadryads;* those over the sea, *Nereids.*

O

O, the fifteenth letter and the fourth vowel in the English alphabet. In English O represents six or seven sounds and shades of sounds: 1, as in *note, go,* etc. 2, The similar short sound as in *tobacco.* 3, The sound heard in *not, gone.* 4, The same sound lengthened as in *mortal.* 5, The sound in *move, do, tomb, prove.* 6, The same sound but shorter as in *wolf, woman.* 7, The sound of *u* in *tub,* as in *come, done, love.* It is also a common element in digraphs, as *oo, oa, ou.*

O', in Irish proper names, a patronymic prefix corresponding to the Mac of the Highlands of Scotland; thus O'Connell means "the son of Connell."

O'ahu, one of the Sandwich Islands (which see).

Oajaca (or Oaxaca) (ō-à-*h*ä'kà), a state of Mexico; area 35,582 sq. mi. It is one of the most beautiful and best cultivated districts in Mexico. Among the minerals are gold, silver, copper, quicksilver, iron, etc. Wheat, maize, indigo, cochineal, cotton, sugar, cocoa, coffee, and many fruits are produced. The only port is Huatulco. The inhabitants are chiefly Indians. Pop. 806,845. The capital, which has the same name, stands 4,800 ft. above the sea. It is well built, about 2 mi. in length by 1¼ mi. in breadth, including the suburbs, which are full of gardens and plantations of cochineal. The inhabitants are industrious, manufacturing silks, cotton, sugar, and chocolate. Pop. 28,000.

Oak, the general name of the trees and shrubs belonging to the genus *Quercus,* having monœcious flowers, those of the males forming pendulous catkins, those of the females solitary or in clusters, and having an involucre which forms the well-known "cup" of the fruit—the acorn. The oak from the remotest antiquity has obtained a pre-eminence among trees, and has not unjustly been styled the "monarch of the woods." In the traditions of Europe and a great part of Asia the oak appears as a most important element in religious and civil ceremonies. It was held sacred by the Greeks and Romans, and no less so by the ancient Gauls and Britons. The species of oak are very numerous, generally natives of the more temperate parts of the northern hemisphere, but found also in Java, Mexico, and South America. The British oak is found in two forms or varieties, by some regarded as distinct species. The common oak attains a height of from 50 to 100 or even 150 ft., with a diameter of trunk of from 4 to 8 ft. Noble specimens of oak trees, and some of them historically celebrated, exist in almost all parts of Britain, but are much more frequent in England than in Scotland. The oak subserves a great number of useful purposes, the wood being hard, tough, tolerably flexible, strong without being too heavy, not readily penetrated by water. Among the other chief species are the black American oak, the white or Quebec oak, dyer's oak, the bark of which is used for tanning and dyeing leather; red oak, the cork oak, live oak, the Turkey oak, furnishing a valuable timber; the valonia oak, whose acorn cups are largely used in tanning; the kermes oak, the edible oak, yielding edible acorns; evergreen oak. The bark of the common oak tree and of several others is preferred to all other substances for the purpose of tanning, on account of the amount of tannic and gallic acid it contains. Oak galls, morbid growths caused by insects, are also much used in tanning. Oak bark is also used medicinally as an astringent. The

Common Oak. *a.*—branch in fruit; *b.*—male flower; *c.*—female flower.

name oak is sometimes popularly applied to timber of very different genera of trees; thus African teak is often called *African oak;* while in Australia the term oak is applied to some species of *Casuarina.* What is known as *green oak* is a condition of oak wood caused by its being colored with the spawn of a species of fungus.

Oak Cliff, Dallas co., Tex., on Trinity River, 3½ mi. s.w. and a residence suburb of Dallas, connected by electric railway. The town was first settled in 1887 and became a city in 1888. Pop. 1900, 3,630.

Oakland, Alameda co., Cal., 7 mi. from San Francisco on San Francisco Bay. Railroads: Southern Pacific and Central Pacific. Seat of the Pacific Theological Seminary; the State University, and state asylum for the deaf, dumb, and blind are located at Berkeley, a suburb of Oakland. Industries include manufacture of jute bags, flour, leather, brass goods,

woolen and cotton goods, nails, etc. Pop. 1900, 66,960.

Oak-leaf Roller, a small moth which is very destructive to trees and takes its name from the fact that the larvæ roll themselves up in the oak leaves, which give them both food and shelter. The front wings are green, but the chief color is brown.

Oakum, the substance of old tarred or untarred ropes untwisted and pulled into loose fibers; used for caulking the seams of ships, stopping leaks, etc. That formed from untarred rope is called white oakum.

Oa'maru, a seaport of New Zealand, on the east coast of Otago, the second town of the provincial district next to Dunedin, with which it is connected by railway. Exports large quantities of cereals and other agricultural produce. It has grain mills, meat-freezing works, woolen factory, etc. Pop. 5,330.

Oan'nes, the Babylonian sea god. He is described as having the head and body of a fish, to which were added a human head and feet. In the daytime he lived with men to instruct them in the arts and sciences, but at night retired to the ocean.

Oar, a long piece of timber flat at one end and round at the other, used to propel a boat, barge, or galley through the water. The flat part, which is dipped into the water, is called the *blade;* the other end is the *handle;* and the part between the two is called the *loom.* Oars are frequently used for steering, as in whale-boats. *Sweeps* are large oars used in small vessels sometimes to assist the rudder, but usually to assist the motion of the ship in a calm. A *scull* is a shoot oar of a length such that one man can manage two, one on each side.

Oarfish, one of the ribbon-fishes, a peculiar deep-sea fish, 15 to 20 ft. or more in length, but having a narrow and extremely compressed body. It is of a silvery color, and is only rarely met with and then usually in a dying condition.

Oa'sis, originally the name of the fertile spots in the Libyan Desert where there is a spring or well and more or less vegetation, but now applied to any fertile tract in the midst of a waste, and often used figuratively. The oases of Northern Africa are generally river valleys, the waters of which are for the most part underground, or depressions surrounded by short ranges of hills, from which small brooks descend, sometimes forming a lake in the center. In recent times oases have been formed in the Northern Sahara by sinking artesian wells. There are many important oases in the Western Sahara, in the Libyan Desert, in Arabia, Persia, and in the Desert of Gobi in Central Asia. In ancient times the most celebrated oasis was that to the west of Egypt, containing the temple of Jupiter Ammon, now called the Oasis of Siwah.

Oat (or Oats), a genus of edible grasses cultivated extensively in all temperate climates, and though principally grown as food for horses largely used when ground into meal as human food. There are about sixty species, the principal of which are the common oat; the naked oat, pilcorn, or peelcorn; the Tartarian or Hungarian oat; the short oat; the bristle-pointed oat; the Chinese oat, etc. The cultivated species of oats are subdivided into a large number of varieties, which are distinguished from each other by color, size, form of seeds, quality of straw, period of ripening, adaptation to particular soils and climates, and other characteristics. The yield of oats varies from 20 bushels to 80 bushels per acre according to soil, etc. The weight per bushel varies from 35 to 45 lbs., and the meal product is about half the weight of the oats. Oatmeal is a cheap and valuable article of food, and its value seems to be becoming more appreciated among the wealthier classes as it is being neglected by the poorer. The wild oat is supposed to be the original of all the species. See colored plate, Grains—Wheat.

Obadi'ah, one of the twelve minor prophets, who foretells the speedy ruin of the Edomites. The prophecy was probably uttered during the period which elapsed between the fall of Jerusalem (586 B. C.) and the conquest of Edom by Nebuchadnezzar (583 B. C).

Obe'ah (or Obi), a species of witchcraft practised among negroes of the West Indies. The practiser of this form of degraded superstition is called an Obeah-man or -woman, and possesses great influence.

Obeid (o-bīd'), EL, an African town, the capital of Kordofan, 220 mi. s. w. of Khartoom. The inhabitants carry on a large trade in gum, ivory, gold, etc. Pop. est. at 20,000.

Ob'elisk, a column of a rectangular form, diminishing toward the top, generally terminating in a low pyramid. The proportion of the thickness to the height is nearly the same in all obelisks, that is, between one ninth and one tenth; and the thickness at the top is never less than half, nor greater than three fourths of the thickness at the bottom. Egypt abounded with obelisks, which were always of a single block of hard stone, and many have been removed thence to Rome and other places. They seem to have been erected to record the honors or triumphs of the monarchs. The two largest obelisks were erected by Sesostris in Heliopolis; the height of these was 180 ft. They were removed to Rome by Augustus. A fine obelisk from Luxor was erected in Paris in 1833, and the two known as Cleopatra's Needles are now in London and New York. See *Cleopatra's Needles.* Besides those of Egypt, monoliths of this appearance, but smaller in size, have been found in the ruined cities of Nineveh and Nimrūd. The obelisks which were common to Rome, Florence, etc., had all been removed from Egypt during its domination by the Roman emperors.

Ober-Am'mergau, a village in Upper Bavaria celebrated for the performance, every ten years, of the passion play of Christ's crucifixion and ascension. The performance takes place every Sunday during the summer, on a large wooden stage open to the sky, and it usually lasts eight hours. Primarily regarded by these Bavarian villagers as a religious exercise, it has become in their performances a mystery play of impressive beauty. Lat-

terly, however, it has taken the character of a European amusement and a source of profit. See *Passion Play.*

Oberhausen (ō'bêr-hou-zn), a town of Prussia, in the Rhine province, 51 mi. e. of the Rhine and 20 n. of Düsseldorf, now an important center of the iron industry, having also coal mines, chemical works, porcelain and glass works, etc. Pop. 20,371.

O'berlin, JOHANN FREDERICH (1740–1826), Lutheran minister. He became pastor of Waldbach in the Steinthal (Ban de la Roche) district of Alsace in 1767, and set about ameliorating the wretchedness of the district and the people. Despite opposition he gradually effected a wonderful improvement in the morals, industry, and thrift of the community. Besides agriculture, Oberlin introduced straw-plaiting, spinning, and weaving into the community, so that the village of a few hundreds became a town with 5,000 inhabitants, and a model to great numbers of philanthropists.

Oberlin College, an institution of higher learning established at Oberlin, Ohio, in 1833. It has a collegiate department and a preparatory school, a department of music, art and physical training, and a summer school. In 1904 it had 93 instructors, 1,509 students and a library containing 68,000 volumes. Oberlin has always been a leader in educational movements. It was the first college to admit colored students. The president is Henry C. King.

O'beron, in popular mythology, a king of the elves or fairies, and husband of Titania. He appears first in the old French poem *Huon of Bordeaux,* but is best known from Shakespeare and from Weber's opera of *Oberon.*

Object Glass, in a telescope or microscope, the lens which first receives the rays of light coming directly from the object, and collects them into a focus. In the finest refracting telescopes the object glass consists of an achromatic combination of lenses, formed of substances having different dispersive powers, and of such figures that the aberration of the one may be corrected by that of the other. The substances chiefly used are crown glass and flint glass.

Obligation is a term in law which describes the bond under which a person binds himself to pay within a certain time and in the breaking of which a penalty is involved; or the tie in general by which a person is legally bound to the performance of anything.

Obock', a port and territory belonging to France on the African coast of the Gulf of Aden, near the entrance to the Red Sea. Total pop. 22,370.

O'Brien, WILLIAM SMITH (1803–1864), Irish nationalist. He entered Parliament in 1826, and subsequently joined the Young Ireland group of politicians, and advocated the use of physical force. In an endeavor (1848) to effect a rising in Tipperary, he was surrounded, arrested, tried by special commission at Clonmel, and sentenced to death, but in the end this was commuted to transportation. He was set at liberty in 1854, and fully pardoned in 1856.

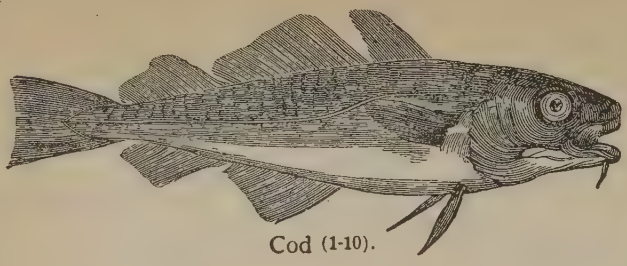
Obscene Books and Pictures.—Acts passed by the legislatures of the several states of the Union give summary power for searching of houses where obscene books, prints, etc., are suspected of being kept, and for the seizure and destruction of such books, etc. The sale, or procuring of them with intent to sell, is a misdemeanor, punishable by fine and imprisonment.

Observatory, a building devoted to the observation of astronomical, magnetic, meteorological, or other natural phenomena. The astronomical observatory is the one of most general interest. Astronomical observation began at an early date in China; the pyramids in Egypt seem in some way to have been associated with stellar observation; and the first historical observatory was founded in Alexandria 300 B.C. Its work was begun by Aristillus, and continued by Timocharis, Hipparchus, Aristarchus, and others. The first European observatory was built at Nuremberg by Bernhard Walther in 1472, and this was followed in the sixteenth century by Tycho Brahe's famous observatory on the island of Hveen, near Copenhagen, while another was erected by the Landgrave of Hesse at Cassel in 1561. Through the labors of Brahe practical astronomy became associated with the universities, so that Leyden and Copenhagen founded observatories. These were followed by the construction of the Royal Observatory at Paris (1667), Greenwich Royal Observatory (1675), the Tuscalan Observatory near Copenhagen (1704), Berlin (1705; new observatory 1835), Vienna (1756), Dublin (1785), Königsberg (1813), Sydney (1820), Cape of Good Hope (1820), Edinburgh (1825), Pulkova near St. Petersburg (1839), Cambridge, U. S. (1839), Washington, U. S. (1845), Melbourne (1853), Lick Observatory, California (1888), and the Yerkes Observatory (1897), located at Lake Geneva, Wis. The telescope has the largest lens yet manufactured for any instrument. The chief instrument used in the observatory is the telescope, whether in the form of the equatorial or in the mural circle and transit instrument, together with the sidereal and the solar clock. In the larger observatories the application of spectrum analysis, photography, photometry, etc., has greatly increased the number and variety of observations. The observatory building must be constructed in a very stable manner, and as the instruments must be out of contact with the walls they are attached to stone pillars that rest on foundations separate from the rest of the building.

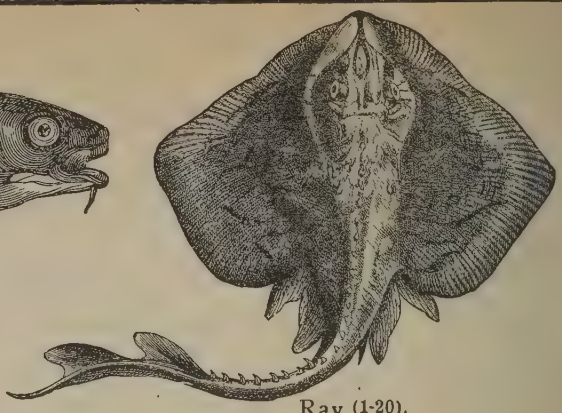
Obsid'ian, a vitreous lava, or volcanic glass lava, which has become glassy by rapid cooling, generally placed among the feldspars. Obsidian consists of silicate of alumina with iron, and lime or potash or soda according to the species of feldspar involved. In Mexico and Peru cutting weapons and rings were manufactured out of it.

Ocari'na, a musical wind instrument of clay, of clumsy shape, pierced with a number of small holes, and giving a sweet tone.

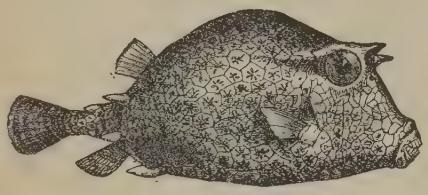
Ocean (or sea), the vast body of water which covers more than three fifths of the surface of the globe. Although no portion of it is com-



Cod (1-10).

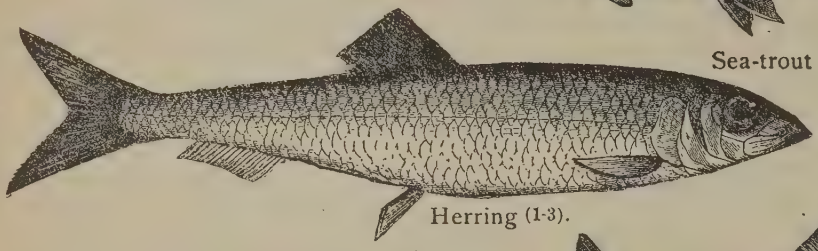


Ray (1-20).



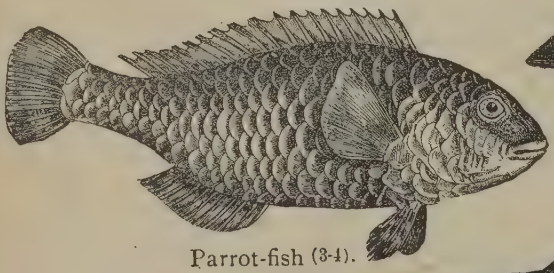
Trunk-fish (1-3).

Sea-trout (1-5).

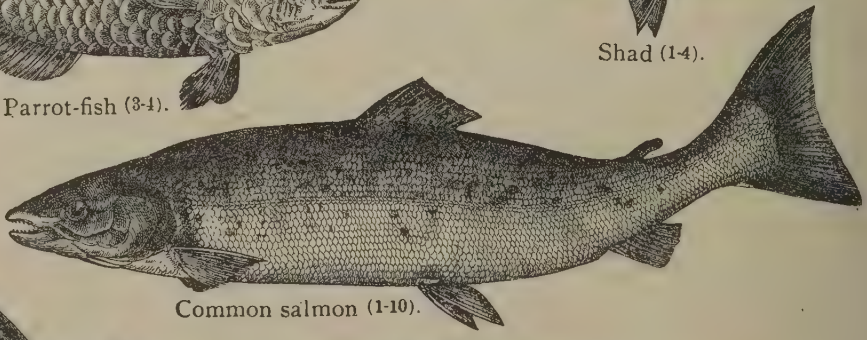


Herring (1-3).

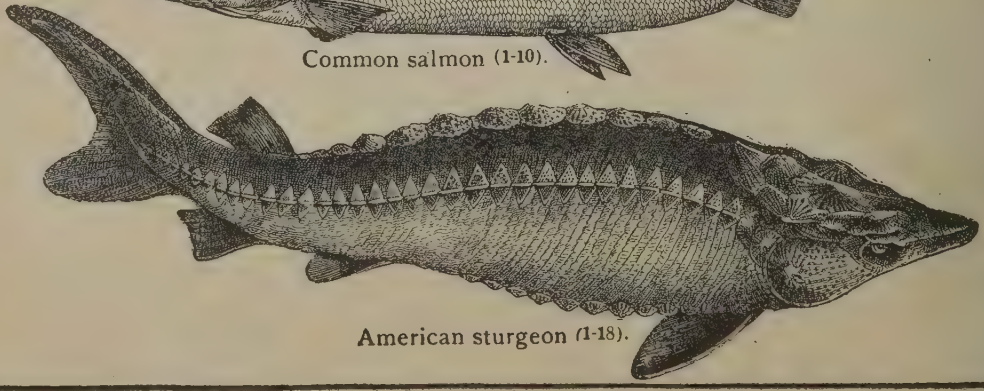
Shad (1-4).



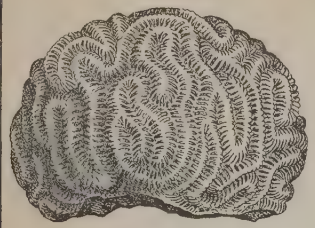
Parrot-fish (3-4).



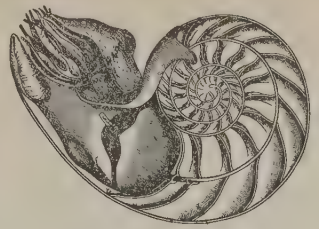
Common salmon (1-10).



American sturgeon (1-18).



Brain coral.

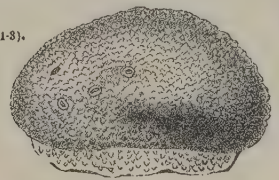


Nautilus (in section) (1-5).

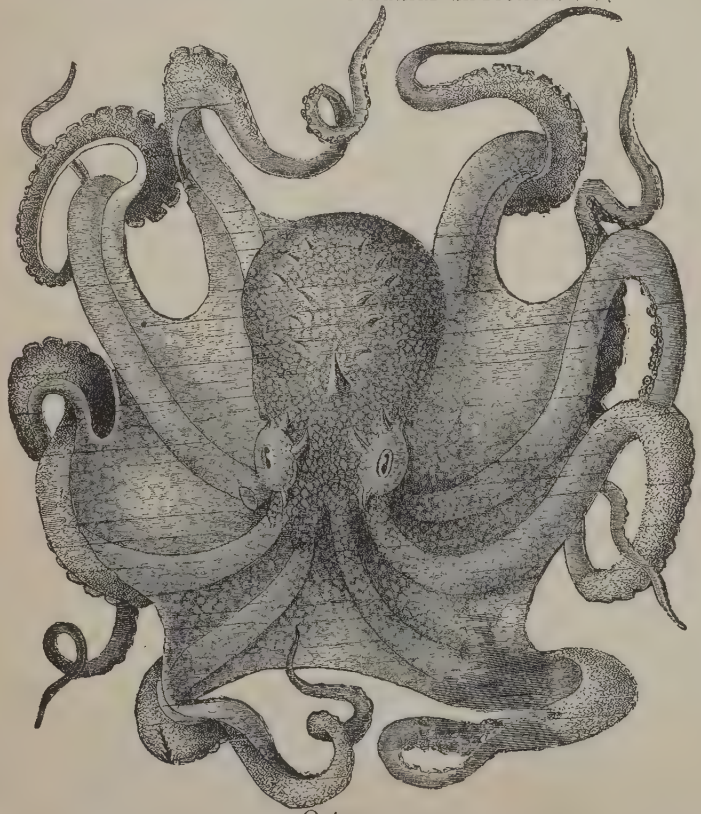
Argonaut (1-3).

Sea cucumber (1-3).

Coral.

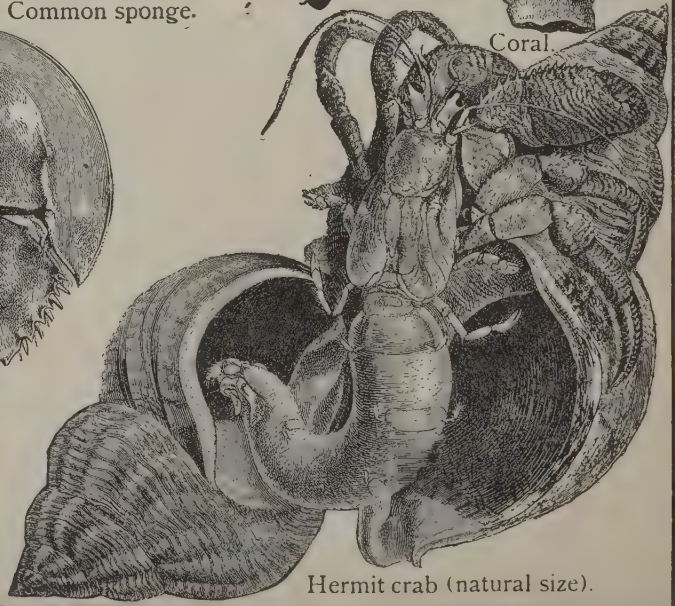


Common sponge.



Octopus (1-9).

Horse-shoe crab (1-4).

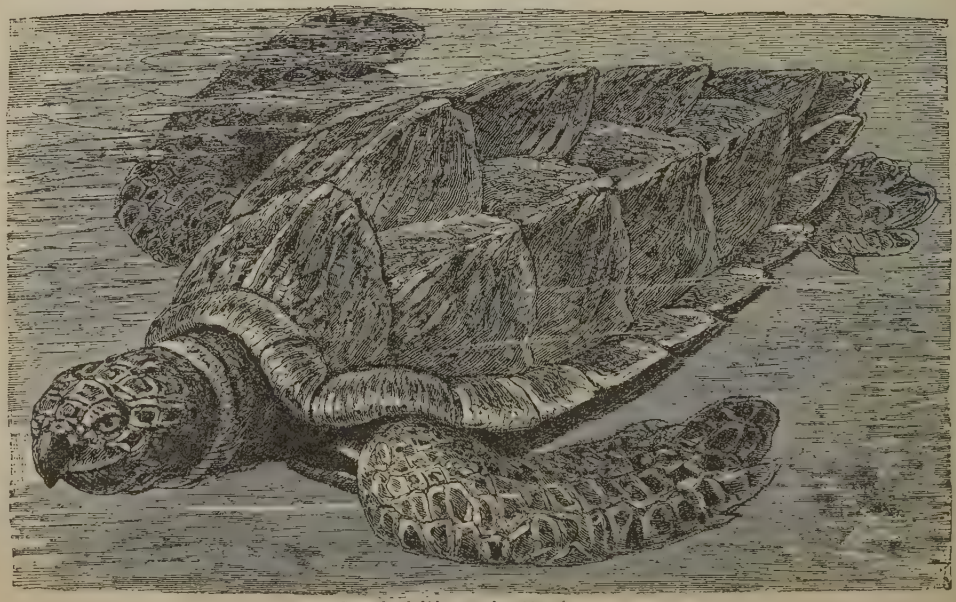


Hermit crab (natural size).

26-3

Sea bear (1-30).

Sea lion (1-45).



Hawksbill turtle (1-15).

pletely detached from the rest, the ocean has often been divided into several great basins or areas, viz., the Pacific Ocean, which separates Asia and Australia from America; the Atlantic Ocean, which separates America from Europe and Africa; and the Indian Ocean, which intervenes between Africa and Australia; together with the Arctic and the Antarctic oceans, round the north and south poles respectively. Between these no very definite limits can be drawn; thus it is impossible to say where the Atlantic or the Pacific ends and Antarctic or Southern Ocean begins. The bed of the ocean appears to present the same irregularities as the surface of the land, being diversified by rocks, mountains, plains, and deep valleys. The deepest soundings at present known are 4,655 fathoms (n.e. of Japan), 4,561 fathoms (n. of Porto Rico), 4,475 fathoms (s. of the Ladrone Islands). See *Atlantic Ocean*, *Pacific Ocean*, etc. The waters of the ocean vary as greatly in temperature as they do in depth. This is partly due to the ordinary effects of isolation; but the abrupt changes and anomalous distribution of temperature is chiefly owing to currents. The Pacific and Indian Oceans are both warmer in low latitudes than the Atlantic, and the mean temperature of the equatorial areas at the surface is assumed to be 81.5°; the warmth of the North Atlantic is anomalous, and due to the influence of the Gulf Stream. This high temperature only applies to the surface water of the ocean, for experience shows that in both hemispheres and in all latitudes the basic water of the ocean is exceedingly cold. In low latitudes water at 32° has been drawn from great depths; while in high latitudes water at 26° has been found. This phenomenon is accounted for by the supposition that the cold water at the poles, by reason of its specific gravity, sinks to the bottom and spreads throughout the ocean basin. The saltness of the ocean is due to the presence of various saline ingredients (chiefly chloride of sodium or common salt), which are generally found in the proportion of from 30 to 40 per thousand. Recent observations have shown that the color and transparency of the water of the ocean are in a large measure dependent on the degree of saltness. In general it is found that the greater the saltness the greater the transparency, and also that where the saltness is very great the water is of a dark blue color, that where it is less the water is of a lighter blue, inclining to green, and that in the neighborhood of rivers (where the saltness is reduced to a minimum) the water is as a rule of a greenish yellow.

Ocea'nia includes all the islands of the Pacific between Asia on the northwest, the Indian Ocean on the west, the Antarctic Ocean on the south, and America on the north and east. It is usually divided into Australasia, Polynesia, and Malaysia or the Malay Archipelago. See Map, Oceania—Australia.

Oce'anus, in Greek and Roman mythology, the eldest of the Titans, regarded as the god of the ocean or the river surrounding the earth, and the parent of the Oceanides or ocean nymphs.

O'celot, a carnivorous mammal of the cat kind peculiar to the American continent. It attains a length of about 3 ft., while the tail

Ocelot.

measures some 18 in. more. The ocelot inhabits great forests; its food consists mainly of birds and rodents; it is timid but bloodthirsty.

Ochre, a combination of peroxide of iron with water, but the name is generally applied to clays colored with the oxides of iron in various proportions. Considerable quantities of ochre are obtained from the ferruginous mud separated from tin and copper ores; and it is also found in natural beds some feet thick in the more recent formations. Ochres vary in color from a pale sandy yellow to a brownish red, and are much used in painting.

Oclawa'ha ("crooked water"), a river of Florida, which after a very winding course of 275 mi. flows into the St. John's about 25 mi. s. of Palatka. Its banks are densely wooded, and the country so flat that the waters extend into the forest for a distance on either side. Many tourists visit it, and one of them relates that he steamed on this narrow river for five consecutive hours, and all that time was out of sight of land. He could see only trees and water.

Ocmul'gee River, a river which rises in the central part of Georgia, runs in a s.s.e. direction, passing the town of Macon, and ultimately unites with the Oconee to form the Altamaha River. Length about 200 mi.

Oco'nee, a river in Georgia, which rises in Hall co., and unites with the Ocmulgee to form the Altamaha at Colquitt. It is navigable about 100 mi.

O'Connell, Daniel (1775–1847), Irish agitator, b. in Kerry and educated at a school in Cork and the Catholic colleges of St. Omer and Douay. He studied for the Irish bar, and soon became distinguished for legal skill and oratory. Turning his energy to Irish politics he advocated Catholic Emancipation; skillfully kept the agitation within constitutional lines; became member for Clare in 1828; and attained his triumph in the following year when the government of the Duke of Wellington granted the Catholic claims. After the Reform bill he became conspicuous as the head of a parliamentary body called "O'Connell's Tail." In 1841 he developed his policy, called together enormous meetings throughout Ireland, and loudly raised a cry for the repeal of the union.

This agitation Sir R. Peel and the government determined to put down. They arrested O'Connell, obtained a conviction, and sentenced him to twelve months' imprisonment with a fine of $10,000. In a few months the House of Lords quashed this judgment. He made his last speech in Parliament April, 1847, and died the following month.

Oconto, co. seat of Oconto co., Wis., on Oconto river and Green Bay, 135 m. n. of Milwaukee. It is in a lumbering region. Railroads: C. & N. W., C. M. & St. P. Industries: lumber, shingle and planing mills; flouring mills and canning factory. The town has a good incandescent light plant and a national bank (capital $60,000). Pop. 1900, 5,646.

Oc'racoke Inlet, an inlet of North Carolina, forming a passage into Pamlico Sound 22 mi. s. w. of Cape Hatteras. On each side of the channel are dangerous shoals; on the bar are 14 ft. at low water.

Oc'tant, in astronomy, that position or aspect of a heavenly body, as the moon or a planet, when half way between conjunction or opposition and quadrature, or distant from another point or body the eighth part of a circle or 45°. The word is also applied to an instrument for measuring angles, resembling a sextant or quadrant in principle, but having an arc the eighth part of a circle, or 45°.

Octave, in music, an interval of seven degrees, or twelve semitones above or below some sound counted from; or one sound eight tones higher than another. The octave is the most perfect of the chords, consisting of six full tones and two semitones major. It contains the whole diatonic scale. The most simple perception that we can have of two sounds is that of unisons, or sounds of the same pitch, the vibrations beginning and ending together. The next to this is the octave, where the more acute sound makes precisely two vibrations while the grave or deeper makes one; consequently, the vibrations of the two meet at every single vibration of the more grave one. Hence the ratio of the two sounds that form the octave is as 1 to 2. See *Music.*

Octa'via, daughter of Caius Octavius and of Atia, and sister to the Emperor Augustus, illustrious for her virtues, her beauty, and her accomplishments, was the widow of Claudius Marcellus, by whom she had a son and two daughters, when she was married, at the instance of her brother, to the triumvir, Mark Antony. The latter neglected her for Cleopatra, queen of Egypt; notwithstanding which, Octavia displayed the most noble fidelity to his house and fortunes, and devoted herself to the education of all his children, until he divorced and ordered her to leave his house, a command she obeyed without complaint. She d. in 11 B.C.

Octavius (or Octavianus). See *Augustus.*

Octa'vo, the size of one leaf of a sheet of paper folded so as to make eight leaves; usually written *8vo;* hence, a book having eight leaves to the sheet. There are different sizes of octavo, arising from the different sizes of paper used; as *foolscap, 8vo, demy 8vo, imperial 8vo.*

Octopus, a genus of fishes familiarly known as cuttlefishes. They have eight arms, each with two rows of suckers, which are sessile or unstalked. The prominent head is joined to the body by a distinct neck, and the body itself is short, generally more or less rounded in shape, and unprovided with side or lateral fins. They have attained a notoriety from tales circulated concerning their ferocity and the existence of gigantic members of the genus, though the largest cuttlefishes that have been met with have belonged to other genera. The common cuttle is common in the Mediterranean. It is said to reach a length of 9 ft., and a weight of 68 pounds, the arms being long and slender.

Common Octopus.

Ocu'ba Wax, a vegetable wax obtained from the fruit of a plant of the nutmeg genus growing abundantly in the marshy grounds on the shores of the Amazon and its tributaries. It is easily bleached, and is used extensively in Brazil for the manufacture of candles.

Odd Fellows, a large and extensively ramified friendly society, having its headquarters in Manchester. It was originally an association of a convivial kind, modeled on freemasonry, and still retains watchwords and secret signs. It assumed its present form at a convention in Manchester (1813), and has spread widely in Britain and elsewhere. The organization was introduced into the U. S. in 1819, and severed its connection with the British Union in 1842. Branch societies connected with England or the U. S. have been founded in Australia, New Zealand, South Africa, South America, etc.

Ode, a poem of lyrical character, supposed to express the poet's feelings in the pressure of high excitement, and taking an irregular form from the emotional fervency which seeks spontaneous rhythm for its varied utterance. The Greeks called every lyrical poem adapted

DEEP SEA LIFE. ANIMALS WITH HEAD AND FEET JOINED. 1. Argonauts. 2. Common Kalmar. 3. The same species, like an egg-shaped grape. 4. Common Krake (eight-footed). 5. Common Cuttle-fish. 6. Eihapsein (of the same species).

to singing—and hence opposed to the elegiac poem—an ode (*ōdē*, that is, *song*). The principal ancient writers who employed this form of verse were Pindar, Anacreon, Sappho, Alcæus, among the Greeks, and Horace among the Romans. As employed by English writers the ode takes either the Pindaric form of strophe, antistrophe, and epode irregularly arranged and contrasted; or, as in its later development, the form of a regular series of regular stanzas. The former style is found in Dryden's *Ode for St. Cecilia's Day*, while the latter is seen in Shelley's *Ode to a Skylark*. The masters of English poesy who have carried the ode to its highest achievements are Milton, Dryden, Collins, Grey, Coleridge, Wordsworth, Keats, and Shelley.

Odense (ō′den-sā), a seaport town of Denmark, capital of the Island of Funen, on a stream, and near the fiord of same name. It is well built, has an ancient and magnificent cathedral, and manufactures cloth, iron castings, etc. Pop. 20,804.

Odenwald, (ō′den-vâlt), a forest and chain of mountains in Western Germany, between the Neckar and the Main, in the territories of Hesse, Baden, and Bavaria. The Odenwald is about 50 mi. in length, and presents charming scenery.

Ode′on (Gr. *ōdeion*, from *ōdē*, a song), a kind of theater in ancient Greece in which poets and musicians submitted their works to the approval of the public, and contended for prizes. The name is now sometimes applied to a hall or chamber for musical or dramatic performances.

Oder, a river of Germany, length about 550 mi. The traffic on this river is important, and the principal towns on its banks are Breslau, Glogau, Frankfort, Kustrin, and Stettin.

Odes′sa, a Russian seaport in the government of Kherson, situated on the Black Sea, between the mouth of the Dnieper and Dniester, on the Bay of Odessa. After the cession of Bessarabia by the Peace of Jassy in 1792, Catherine II fixed on this spot, then containing only a few houses, as a commercial emporium. The roadstead is large and deep, but dangerously exposed to easterly winds. The shipping, however, is protected in three large harbors inclosed by moles, and the city is fortified in the modern style. Odessa is one of the chief wheat ports in the East, while wool, timber, hemp, flax, iron, coal, etc., are among the staple exports. Besides the maritime trade Odessa carries on a large overland trade by rail with Germany, Austria, France, Switzerland, and Italy. Odessa was partially bombarded in 1854 during the Crimean War. Pop. 313,687.

Odin (or Woden), the chief god of Scandinavian mythology, the omniscient ruler of heaven and earth, having his seat in Valaskjalf, where he receives through his two ravens tidings of all that takes place in the world. As war god he holds his court in Valhalla, where all brave warriors arrive after death and enjoy the tumultuous pleasures they delighted in while on earth. His wife is Frigga. The fourth day of the week, Wednesday, derived its name from this deity. See *Northern Mythology*.

Odoa′cer (476–493), the first barbarian king or ruler of Italy after the fall of the Western Empire. He was of German origin, the son of Edico or Idico, hereditary head of the Scyrri tribe, and received his early training in the camp of Attila, king of the Huns. He afterward journeyed into Italy, and joined the imperial guard of the Roman army. He was chosen head of the barbarian confederates, and having overthrown Romulus Augustulus, the last of the Roman emperors, he assumed the title of king in 476. Out of policy he paid court to the Byzantine emperor Zeno, from whom he received the title of *Patricius* or Patrician. He ruled with vigor and wisdom. In 489 Italy was invaded by the Ostrogoths under Theodoric, and in repeated battles Odoacer was defeated, being latterly besieged in Ravenna, on the fall of which he was assassinated.

Odontoglos′sum, an extensive genus of orchids, natives of Central America, much prized by cultivators for their magnificent flowers, which are remarkable both for their size and the beauty of their colors. A considerable number of species have been introduced into Europe, and grow well in a moderate temperature.

Odysseus (o-dis′ūs). See *Ulysses*.

Od′yssey, an epic poem attributed to Homer, in which the adventures of Odysseus (Ulysses) are celebrated. See *Homer*.

Oedenburg (*eu′*dėn-bu*r*h), a town of Western Hungary, capital of the county of the same name, on a plain near Lake Neusiedl, 36 mi. s.s.e. of Vienna. It is well built, and has manufactures of woolen, linen, cotton cloth, sugar refining, etc. Pop. 21,169.

Œ′dipus, in ancient Greek legend, son of King Laius of Thebes, was exposed as an infant—on account of an oracle saying that Laius would be killed by his son—and was brought up at the court of Corinth. Having solved the riddle of the Sphinx he became king of Thebes, unknowingly killed his own father and married his mother Jocasta—a fate foretold by the Delphic oracle. On realizing what had been done Jocasta hanged herself, and Œdipus put out his own eyes. This story has been used by the poets to symbolize the helplessness of man before Fate. The Œdipus of Æschylus and Euripides are lost, but the King Œdipus and Œdipus at Colonos of Sophocles remain. The story has also been made the subject of tragedies by Corneille, Voltaire, Chénier, Dryden, and Lee.

Oesel (*eu′*zl), an island of Russia, government of Livonia, in the mouth of the Gulf of Riga. It raises corn, hemp, flax, and the fisheries are valuable. Pop. 46,000.

Œta, a mountain in ancient Greece forming the south boundary of Thessaly, and separating that country from Central Greece. At the east extremity was the Pass of Thermopylæ. See *Thermopylæ*.

Offa, a distinguished king of Mercia, who

attained the throne after Ethelbald, on defeating the usurper Beornred, A. D. 757. He brought Kent under his sway, and reduced the power of Wessex by a defeat inflicted in 777. He also defeated the Welsh, took from them their border lands, and to keep them within their new limits erected here the ramparts known as Offa's Dike. Latterly he murdered Ethelbert, king of East Anglia, and seized his kingdom. He founded the Abbey of St. Albans, and was a liberal patron to the church. He d. in 796.

Offenbach (of'en-bȧh), a town of Germany, Grand-duchy of Hesse, 5 mi. e.s.e. of Frankfort. It is an important commercial and manufacturing center, its industries embracing various chemical products, as aniline, white lead, vaseline, celluloid, etc.; metal goods, leather and leather goods, paper, etc. Pop. 31,704.

Offenbach, JACQUES (1819–1880), French composer, b. of Jewish parents at Cologne. He entered the Paris Conservatoire in 1835; became proficient on the violoncello, and for some time played on this instrument in the orchestra of the Théâtre Comique. In 1847 he became conductor of the Théâtre Français, and subsequently opened the "Bouffes Parisiens," where he enjoyed immense popularity as the composer of such operas as *Orphée aux Enfers*, *La Grande Duchesse*, *La Belle Hélène*, *Madam Favart*, *La Barbe Bleue*, *Geneviève de Brabant*, and *La Princesse de Trebizonde.*

Offing, a nautical term signifying the position of a vessel, or of a portion of the sea within sight of land, relatively to the coast. The offing may be taken to represent that part of the sea beyond the midline between the coast and the horizon.

Og, king of Bashan at the time of the conquest of Canaan by the Israelites, by whom he and his people were destroyed.

Ogden, Weber co., Utah, on Ogden and Weber River. Railroads: Union Pacific; Rio Grande Western; Central Pacific; O. & H. S.; O. E. & P. C.; O. & S.; and Oregon Short Line. Industries: railroad machine shops, four flouring mills, two iron foundries, three canning factories, broom, tile, and other factories, packing house, and creamery. Surrounding country agricultural and mineral. Town site laid out by Brigham Young in 1850 and became a city in 1861. Pop. 1900, 16,313.

Ogdensburg, St. Lawrence co., N. Y., on St. Lawrence River, 142 mi. n. of Rome. It is a popular summer resort. Railroads: R. W. & O.; and Central Vermont. Industries include the manufacture of flour, lumber, leather, machinery, etc. It has also immense grain elevators, the grain trade being very large. Pop. 1900, 12,633.

Og'ham, a particular kind of writing practised by the ancient Irish and some other Celtic nations. Its characters (also called *oghams*) consist principally of lines or groups of lines deriving their significance from their position on a horizontal or chief line, under, over, or through which they are drawn either perpendicular or oblique; curves rarely occur. Authorities differ as to the total number of letters represented in the alphabet, some making sixteen, others twenty-five. Regarding the age of this form of writing it is now supposed that it was used not only in prehistoric times, but also so late as the ninth and tenth centuries. Stones with ogham inscriptions are found in Leinster and Connaught, also in some parts of Wales. Spelled also *Ogam.*

Oglesby, RICHARD JAMES, b. in Kentucky in 1824. He began life as a carpenter and later studied law and was admitted to the bar of Illinois in 1845. He took an active part in the Mexican War and went to California in 1849. In 1860 he was elected state senator but preferred to join the Union forces in the Civil War. He was made major general. In 1864 he was elected governor of Illinois and re-elected in 1872. He was U. S. Senator from 1873 to 1879, and was again elected governor in 1885. D. April 24, 1899.

Oglio (ol'yō), a river of North Italy, which rises in the Alps, drains Lake Iseo, and falls into the Po: length 150 mi.

O'goway (Ogowai, or Ogowé), a river of Africa. Its course is chiefly in the French Congo Territory, and its chief affluents are the Ivindo and the Ngunie. A number of French stations have been established on its banks.

Ogyges, (o-gī'jēz), in Greek mythology, the most ancient ruler of Attica, in whose reign happened the great deluge.

Ohi'o, a river, formed by the confluence of the Alleghany from the north and the Monongahela from the south, at Pittsburg in Pennsylvania, where it is a navigable stream 600 yds. broad. It flows w.s.w., separating the states of Virginia and Kentucky on the s. from Ohio, Indiana, and Illinois on the n., and enters the Mississippi at Cairo. Its length from Pittsburg to its junction with the Mississippi is 975 mi.; area of basin, 214,000 sq. mi. The width of the river varies from 400 to 1,400 yds., average width, about 800 yds., at its mouth 900 yds. Its principal affluents are the Miami, Kentucky, Wabash, Green, Cumberland, and Tennessee.

Ohio, the *Buckeye State*, is situated in the n. e. part of the central belt of states. It is bounded on the n. by Michigan and Lake Erie, on the e. by Pennsylvania, on the e. and s. by the Ohio river, which separates it from West Virginia and Kentucky, and on the w. by Indiana. The greatest length from e. to w. is 225 m.; the greatest breadth from n. to s. is 210 m.; and the total area is 41,050 sq. m. In 1900, the population was 4,156,545, of which 97,341 were colored.

Surface.—The surface is divided between two great basins, that of Lake Erie in the n. e., which declines gently toward the shores of the lake and includes about one-fourth of the area of the state, and that of the Ohio river, which slopes in a general southerly and eastery direction toward the great river. Separating these two basins and crossing the state in a southwesterly direction is the Great Divide, a low ridge which scarcely rises above the level of the country about it. The north-

ern and central portions of the state are, in general, level; the southern part is somewhat hilly, the valleys growing deeper as they approach the Ohio river. The elevation of the state varies from somewhat less than 500 ft. to 1,540 ft., the average being about 850 ft. Chief of the streams flowing into Lake Erie are the Grand, the Cuyahoga, the Sandusky and the Maumee. The principal tributaries of the Ohio are the Muskingum, Hocking, Scioto, Little Miami and the Great Miami. Sandusky Bay and Maumee Bay on the shore of Lake Erie are important harbors.

Climate.—The climate is generally healthful, though sudden changes in temperature are frequent and extreme. The constantly varying winds, however, greatly lessen the duration of the extremes. In the north the winters are cold, but moderated near the lake shore by the milder temperature of the water; the summers and autumns are temperate and pleasant. In the southern portion the winters are comparatively short and mild and the snowfall is not heavy; the summers are long and hot. The mean annual temperature is about 51° and the annual rainfall about 38 in.

Mining.—The carboniferous conglomerate and the coal measures have an aggregate thickness of at least 1,500 ft., and have an area of 1,200 square miles. The beds of coal, iron ore, fireclay, limestone, and cement rock, contribute the chief portion of the mineral wealth of the state. In the important fields, the average thickness of the seams of coal is five feet; the maximum thickness is thirteen feet, and very little coal is taken from seams less than three feet in thickness. Iron ore is worked at many horizons in the coal measures in seams ranging from 6 inches to 19 feet in thickness. The clays of the coal measures furnish material for a large and rapidly growing manufacture of stone and earthenware. Ohio is fourth in rank among salt-producing states and produces about one-half the world's supply of bromine. The oil fields in Ohio, forming part of the great Appalachian oil territory, yield a considerable part of the immense output from that region. Natural gas has been found in very large quantities.

Agriculture.—The greater part of the soil is arable. The bottom lands of the Scioto, Miami, and Muskingum rivers are remarkable for their production of corn; wheat, oats and corn are grown profitably in every part of the state, and the farm products are varied and of unusually high grade. On the shores and islands of Lake Erie, vine culture is especially successful and great quantities of the finest quality of grapes are produced. The forests of Ohio cover less than one-fifth of the state. The northern portion of the state is well suited to grazing, and stock-raising and dairying are leading industries.

Manufactures.—For the value of manufactures, Ohio ranks fifth in the United States. In 1900, the total value of her manufactures was $834,834,666. In the manufacture of iron and steel products, Ohio is second to Pennsylvania only. Allied to and next in importance to the manufacture of iron and steel, is the manufacture of foundry and machine shop products, of which Cleveland and Cincinnati are the great centers. The industry, which ranks third in the state, and in which Ohio ranks third among the states, is flouring and grist milling. Of the other leading industries, the production of malt and distilled liquors and of wine from Catawba grapes, the manufacture of lumber and timber products, and slaughtering and meat-packing are most notable. In the manufacture of stone and earthen ware, Ohio ranks first among the states, and produced in 1900 26.8 per cent of the product for the country.

Transportation.—The high degree of development of the manufacturing industries is largely due to the unusually excellent means of water transportation. Ready communication is possible with the Atlantic coast by means of Lake Erie and the Erie Canal; with the states of the northwest through the Great Lakes; and with the Mississippi Valley by means of the Ohio river. Canals extend across the state from Toledo to Cincinnati, and from Cleveland, via Columbus, to Portsmouth. Besides this system of lakes, rivers and canals, there is a vast system of trunk and local lines of railway in Ohio; notable among the former are the Baltimore & Ohio railroad, the Cleveland, Cincinnati, Chicago & St. Louis; the Erie; the Lake Shore & Michigan Southern; the Michigan Central; the Pennsylvania system and the Wabash. The total railway mileage in 1901 was 8,872.81.

Education.—Somewhat less than $14,000,000 is annually expended for public instruction in Ohio, and the state ranks high for its public school system. The state institutions of higher learning are Miami University at Oxford, Ohio University at Athens, the State University at Columbus and Wilberforce University at Wilberforce. Among the oldest and most prominent private colleges and universities are Marietta College, Oberlin College, Ohio Wesleyan University, St. Xavier's and the Western Reserve University; of those more recently founded, the University of Cincinnati and the Case School of Applied Science at Cleveland, are notable. The chief educational charitable institutions maintained by the state are a Girls' Industrial School at Delaware; a Boys' Industrial School near Lancaster; and institutes for the education of the blind, of the deaf and dumb, and of feeble-minded youth at Columbus. There are, besides, seven state hospitals for the insane, a hospital for epileptics, a soldiers' and sailors' home and a state reformatory. The state penitentiary is at Columbus.

History.—Ohio was discovered by La Salle, probably as early as 1670, and the French took formal possession of the whole northwest in 1671. A few years later conflicting claims arose between the French and the English regarding this territory, which were set at rest by the Treaty of Paris in 1763, by which France surrendered to Great Britain all her lands in the north and west as far as the Mississippi.

In 1787, the Ohio Company of Associates was organized in New England by those who had served in the War of the Revolution, and under their auspices a large tract of land was purchased from the government in the territory northwest of the Ohio river. This was the first public sale of land by the U. S. government. In connection with its sale, the famous "Ordinance of 1787" was passed, guaranteeing forever in the territory civil and religious freedom, the system of common schools, trial by jury and the right of inheritance. In 1788, Marietta and Cincinnati were founded; and till 1791, settlements in the southern part of the territory increased rapidly. In that year the Indians became troublesome. Late in 1794, a victory was gained by Gen. Anthony Wayne over the Indians at "Fallen Timbers," on the Maumee river. The next year a treaty of peace was concluded, the Indians ceding a great portion of the territory, which settlers began at once to fill. Chillicothe was made the seat of government for the territory, and a capitol building erected. In 1802, a constitution was adopted for the eastern division of the territory northwest of the Ohio, to be known as "Ohio," and on Feb. 19, 1803, Ohio was admitted into the Union. Ohio took an active part in the War of 1812 and the Civil War. Because of the many waterways leading to Ohio and the varied natural resources, the course of western immigration set toward the state and built it up rapidly. Until 1880, Ohio exceeded in population all states west of the Allegheny mountains and now has second rank among these states. The rate of development of the state continues unchecked. The principal cities with their population in 1900, are: Columbus, the capital, 125,560; Cleveland, 381,768; Cincinnati, 325,902; Toledo, 131,822; Dayton, 85,333; Youngstown, 44,885; Springfield, 38,253; Canton, 30,667; Zanesville, 23,538; Lima, 21,723; Sandusky, 19,664; Newark, 18,157; and Portsmouth, 17,870.

Ohio State University, a State institution of higher learning at Columbus, O., founded in 1870, as the Ohio Agricultural and Mechanical College. It was given its present name in 1878. The university comprises a college of liberal arts and departments of agriculture, domestic science, engineering, law, pharmacy and veterinary medicine. It has a faculty of about 140, an attendance of about 1,800 and a library containing nearly 50,000 volumes. The president is W. O. Thompson.

Ohm (ōm), GEORGE SIMON (1787–1854), German physicist. He became successively professor of physics at Cologne, director of the Polytechnic at Nuremberg, and professor of physics at the University of Munich. He was the discoverer of what is known as "Ohm's Law" in electricity (which see); and among his scientific works were *Die Galvanische Kette, Grundzüge der Physik,* etc.

Ohm, the unit of resistance to the passage of electricity adopted by the British Association. A piece of pure copper wire 485 meters long and 1 millimeter in diameter at 0° C. has a resistance of about one ohm. A "megohm" is a resistance equal to 1,000,000 ohms, and a microhm is a resistance equal to one-millionth of an ohm. The International Ohm of the Electrical Congress (1893), is the resistance of a column of mercury, length 1,063 meters; weight 14.4521 grains; temperature 0° C.

Ohm's Law, an important law in electricity, deduced by Professor Ohm, to the effect that the intensity of the electric current is directly proportional to the whole electromotive force in operation, and inversely proportional to the sum of the resistances in the circuit.

Oïd'ium, a genus of microscopic fungi. *O. Tuckeri* is the vine mildew, parasitical, in the form of a white and very delicate layer, upon the leaves and green parts of vines, and destroying the functions of the skin of the part it attacks.

Oil City, a city of Venango co., Pa., 132 m. n. of Pittsburg; on the Allegheny river at the mouth of Oil creek, and on the Erie, the Allegheny Valley, the L. S. & M. S. and West. N. Y. & Pa. railroads. Oil City is the center and headquarters of the Pennsylvania oil region. In its early days it was wholly dependent on the oil industry, but now manufactures oil well supplies, tubing, engines and boilers. The city and vicinity afford the visitor an excellent opportunity of witnessing the various operations of obtaining, refining, barreling, gauging and shipping the petroleum The Valley of Oil Creek is famous as the scene of the earliest "operations in oil." The old derricks and tanks are still standing. Pop. 1900, 13,264.

Oil Gas, the inflammable gas and vapor (chiefly hydrocarbon) obtained by passing fixed oils through red-hot tubes, and which may be used like coal gas for purposes of illumination. The oil in its passage through the retorts is principally decomposed, with the production of ethylene, marsh gas, hydrogen, carbonic oxide, benzene, etc., a gas being thus produced which has the great advantages of being pure from sulphurous contamination, and of supporting a very brilliant flame with a very small expenditure.

Oil of Vitriol, the common name of strong sulphuric acid (which see).

Oil Palm, an African tree abounding on the west coast of that continent, whose fruit yields palm oil. See *Palm Oil.*

Oils, a term given to substances formed within living animal or vegetable organisms, liquid at ordinary temperatures, having a more or less viscid consistence, insoluble in and lighter than water, taking fire when heated in air, and burning with a more or less luminous flame. The oils are usually divided into the *fat* or *fixed oils,* and the *volatile* or *essential oils.* Another division would be into *vegetable oils,* by far the most numerous, and *animal oils;* and as a third popular division, the *mineral oils* (petroleum, naphtha). The fat or fixed oils are subdivided into the *drying* and the *non-drying oils.* The former class includes all oils which thicken when exposed to the air, through the absorption of oxygen, and are converted thereby into varnish, as, for example, linseed, nut, poppy, and hemp-seed oil. All the drying oils are of

vegetable origin. The *non-drying* oils (which are partly of vegetable, partly of animal origin) when exposed to the air also undergo a change resulting in the formation of acrid, disagreeably smelling, acid substances, but though they thicken they do not become dry. The fixed vegetable oils (whether drying or non-drying) are generally prepared by subjecting the seeds of the plant to pressure, with or without heat, and they may also be extracted by means of certain solvents. The animal oils are, for the most part, the fluid parts of the fat of the animal, and are separated by heat alone. Vegetable fixed oils all consist of one or more proximate principles. Thus olive oil contains chiefly olein, with a little stearin; linseed oil is composed mainly of linolein. The most important of the drying oils are linseed, hemp, walnut, poppy, candle nut, sesame, sunflower, madia, safflower. Of the non-drying oils the chief are olive, cotton seed, colza, rape, ground nut, castor, croton, etc. A certain number of the vegetable oils are also known as vegetable fats, from their consistency at ordinary temperatures, such as palm oil, cocoanut oil, shea-butter. The animal oils comprise neat's foot oil, train oil, seal oil, sperm oil, porpoise oil, cod liver oil, shark oil, etc. The uses of the fixed oils are very various. Many are used as

Volatile oils are generally obtained by distilling the vegetables which afford them with water; they are acrid, caustic, aromatic, and limpid; they are mostly soluble in alcohol, forming essences. They boil at a temperature considerably above that of boiling water, some of them undergoing partial decomposition. A few of them are hydrocarbons; the greater number, however, contain oxygen as one of their ultimate elements. They are chiefly used in medicine and perfumery; and a few of them are extensively employed in the arts as vehicles for colors, and in the manufacture of varnishes, especially oil of turpentine. They are very numerous, among them being the oils of anise, bergamot, clove, cinnamon, cajeput, lavender, lemon, lime, orange, mint, peppermint, nutmeg, marjoram, rosemary, thyme, etc.

Oil Tree, a name for several trees, especially the *Ricĭnus communis*, from the seeds of which castor oil is expressed; and an Indian tree, from the seeds of which a thick oil is expressed, which the Hindus use for their lamps, for soap, and for cooking.

Oise, a northern department in France, bounded by the departments of Somme, Seine-Inférieure, Eure, Seine-et-Oise, Seine-et-Marne, and Aisne; area 2,261 sq. mi. A considerable part of the soil is a strong clay, well adapted for wheat; but barley, oats, and rye are considered the most profitable crops, and a great number of cattle are reared. Pop. 403,146.

Okapi, a giraffe-like animal recently discovered in the Congo region of Africa. The discovery was made by Sir Harry Johnson, British Commissioner to Uganda, to whom two dried skins were brought by the natives. The okapi belongs to the same family as the giraffe, and is about the size of an ox. The fore legs are slightly elongated, but the neck is of ordinary length. The body, neck and forehead range from black to sepia brown. The muzzle is sepia, and the cheeks and jaws are a yellowish white. The fore legs, hind quarters and hind legs are white or cream-colored with tinges of orange, and are banded with black stripes. The animal lives in the interior of the densest forests, where it is hunted by the dwarfs.

Okeecho'bee Lake ("Big Water"), a large shallow lake in Southern Florida; about 40 mi. in length by 25 in breadth, and with a maximum depth of 12 ft. Its waters are discharged through the Everglades, but there is no appreciable outlet stream. It contains a few low islands, and a drainage company has been reclaiming land since 1881.

Okhotsk (o-*h*otsk') SEA OF, an inlet of the North Pacific Ocean, bounded on the n. by Russian Siberia, e. by Kamtchatka, partly enclosed by the Kurile Islands on the s. and the island of Saghalien on the w. On the northern shore is the small seaport of the same name.

Oklahoma (ok-lä-ho'ma), the *Boomer's State*, a territory of the United States, bounded on the n. by Colorado and Kansas, on the e. by the Indian Territory, on the s. by the Indian Territory and Texas, and on the w. by Texas and New Mexico. It lies between latitude 34° and 37° n.; long. 96° 30′ and 100° w. The gross area is 39,030 sq. m. The population in 1900 was 398,331, representing an increase of 336,497 during the last ten years.

Surface.—In general, the surface is rolling prairie with timber skirted streams throughout, some considerable timber area in the e., rough hills in the central w., and rugged mountains in the s. w. There are no very large rivers, but a number of small streams, among which are the Cimarron, Arkansas, Canadian and Red rivers. The principal mountains are the Wichita, the Chataqua and the Gloss ranges.

Climate.—The climate is healthful; in the e. it is especially delightful, but in the w. it is marked by extremes of heat and cold. The average annual temperature is 58.4°; the average annual rainfall about 36 in.

Mining.—Previous to 1902, very little attention had been paid to mining in Oklahoma, but in that year a mining agitation began. Zinc and lead, also some copper, have been found in Osage Reservation, in the Gloss mountains and in Blaine county. Several valuable copper mines are being worked in Beaver county. Coal has been found in several sections but has never been mined in marketable quantities. It is believed that the prospect for mineral development in the territory is good. Evidences of gold, silver, zinc, iron and oil have been discovered. Other undeveloped resources are extensive stone, cement and clay deposits, rock salt, asphalt, marble and gypsum beds.

Agriculture.—The present prosperous condition of Oklahoma is due to agriculture alone. Nowhere else in the United States can the three great staples, wheat, corn and cotton, be

successfully grown on the same quarter section of land. The chief products are wheat, corn, cotton, potatoes, melons, castor beans, peanuts and broom corn. Oklahoma wheat was awarded first premium at the Chicago World's Fair. Stock raising is a profitable industry. The large pastures have been practically broken up, and fine cattle and horses are being produced upon small ranches or farms. Very fine apples, peaches and strawberries are grown for the early markets. Other fruits are cherries, pears, apricots apples and grapes.

Manufactures.—The manufacturing industries are only in their infancy. In 1890, there were only 72 establishments; in 1900, there were 868. The chief industries are flouring mills, cement works, manufacture of wines, lumber mills, cotton gins, stone quarries, ice plants and canning factories. Oklahoma flour has a national reputation for excellence. The territory publishes a large number of newspapers.

Transportation.—The railway preceded the settler in Oklahoma, but so rapid has been the growth of settlement that the railway growth has not kept up to the need in certain sections of the territory. Railroads: A. T. & Santa Fe, St. L. & S. F., C. R. I. & P., Choctaw, Oklahoma & Gulf, and Blackwell, Enid & S. W. Several other lines are in process of construction.

Education.—Much interest is taken in schools in Oklahoma. One of the first acts of the legislature was to enact laws for the establishment and support of a public school system. The qualifications of teachers are similar to those required in the states. The average length of a school term is now five months. Provision has been made for a library in every school district. Kingfisher, Oklahoma City, and Guthrie have excellent high schools. Higher institutions of learning are the University of Oklahoma (1892) at Norman, Agricultural and Mechanical College at Stillwater, Territorial Normal School at Edmund and Kingfisher College at Kingfisher.

History.—Spanish explorers visited this territory in 1662. Lewis and Clark explored it at an early date. Washington Irving made a hunting trip here in 1834, which he graphically describes in his sketch, *A Tour of the Prairies.* This territory was a part of the Louisiana tract purchased from France in 1803, and was included in the area set apart for the Indians in 1834. In March, 1889, occurred the Payne and Couch boom, and in April a little area of land then known as Oklahoma was opened to settlement. In June, 1900, the territorial government came into existence and the strip of country known as "No Man's Land" was added as Beaver county. In September of the same year, 1,282,434 acres embraced in the Sauk and Fox, Iowa and Potawatomie reservations were opened to settlement, and the following spring came 4,297,771 acres of Cheyenne and Arapaho land. In 1893, the Cherokee strip, 6,014,239 acres, was opened to settlement; in 1895, the Kickapoo reservation of 206,662 acres was settled, and in 1896, Greer county, which had been previously considered a portion of Texas, was given to the territory by a decision of the United States supreme court. These with the Kiowa, Comanche and Apache and the Wichita Indian reservations just opened (1901), give the territory a settled area of 24,000,000 acres. The growth of Oklahoma has been remarkable. In the little more than a decade which has elapsed since the creation of the territory, the people have accomplished more than any other community has ever accomplished in a quarter of a century. More than 50,000 persons entered the territory on the first day it was opened to settlement. During the afternoon of that day a bank was opened at Guthrie with a capital of $50,000. There were in 1901, 31 national and 113 territorial banks with aggregate resources of $16,495,465.58. In 1893, at the opening of the Cherokee strip, 90,000 people entered. The striking feature of the settlement of Oklahoma is its permanent nature. Progressive, energetic men have brought money, brains and modern methods to the development of the territory. Ninety-six per cent of the present population are American born. The principal cities, with population in 1900, are: Guthrie, the capital, 10,006; Oklahoma City, 10,037.

Oklahoma City, co. seat of Oklahoma co.; 25 m. s. of Guthrie; on the North Canadian river and on the Atch., Top. & Santa Fe; Choc., Okla. & Gulf; St. L. & Okla. and the C. R. I. & P. railroads. It is the largest cotton market in Oklahoma; contains flour mills, cotton gins, brickyards and packing-houses, and has a large local trade. It has a public library, good schools, a $30,000 city hall and several daily and weekly newspapers. Pop. 1900, 10,037.

Oldenburg, a grand-duchy in the north of Germany, consisting of three separate and distinct territories, viz., the duchy of Oldenburg, the principality of Lübeck, and the principality of Birkenfeld; total area 2,479 sq. mi. 1, The first of these divisions, the duchy of Oldenburg, is bounded on the north by the German Ocean, and on the other three sides by Hanover and Bremen; the country is flat; the soil marshy and sandy, with little cultivation and large tracts of heath and forest; the principal river is the Weser. The chief crops are wheat, oats, rye, hemp, and rape. Stock breeding is extensively carried on, and there are industries connected with cotton, wool, jute, etc. 2, The principality of Lübeck, situated in East Holstein, north of the town of Lübeck, is bounded partly by the Baltic; area 210 sq. mi., of which the greater part is cultivated. Chief town Eutin (pop. 4,574). 3, The principality of Birkenfeld, situated in Rhenish Prussia, is a hilly country with fertile valleys; area 194 mi.; the chief towns Birkenfeld and Oberstein. Oldenburg was raised to the dignity of a grand-duchy by the Congress of Vienna in 1815, and the greater part of the two principalities added to it. Pop. Oldenburg, 279,008; Lübeck, 34,721; Birkenfeld, 41,242; total 354,968. The capital is Oldenburg, pop. 23,118.

Oldham, a town of England, in Lancashire, 6 mi. n.e. of Manchester. The spinning and weaving of cotton are the staple industries of the town, and employ within it and in its vicinity about 250 mills; and there are several large machine shops, foundries, tanneries, roperies, silk factories, bleach works, etc. Pop. 183,871.

Old Town, Penobscot co., Me., 12 mi. n.e. of Bangor, on Penobscot River. Railroads: Maine Central; and Junction, Bangor & Aroostook. Has numerous sawmills, and extensive water power. Pop. 1900, 5,763.

Olean, city of Cattaraugus co., N. Y., 69 m. e. s. e. of Buffalo; on the Allegheny river, and on the Erie, the West. N. Y. & Pa., and the Cent. N. Y. & West. railroads. Olean is an important shipping station at the head of navigation on the Allegheny river. It borders on the largest hemlock timber belt in the U. S. and on the Pennsylvania oil fields. It is the eastern terminus of the Ohio pipe line and the western terminus of a pipe line from the Pennsylvania oil fields to the Atlantic coast. It contains large oil refineries with immense storage tanks and is the center of extensive lumber and tanning interests. There are also flour mills, foundries, machine shops, railway shops and other industries. The town was settled in 1803. It has a public library and a state armory. Pop. 1900, 9,462.

Olean'der, a plant known also by the name of rose bay, a beautiful evergreen shrub, with flowers in clusters, of a fine rose or white color but of an indifferent smell. The plant, especially the bark of the root, is medicinal and poisonous.

Oleas'ter, also called wild olive tree, a small tree of the south of Europe and west of Asia, often cultivated in English gardens and shrubberies especially for its blossoms, which are very fragrant. It flowers in May.

Olef'iant Gas, the name originally given to ethylene or heavy carbureted hydrogen. It is a compound of carbon and hydrogen, and is obtained by heating a mixture of two measures of sulphuric acid and one of alcohol. It was discovered in 1796. It is colorless, tasteless, and combustible, and has an aromatic odor not unlike that of oil of caraways.

Ole'ic Acid, an acid resulting from the action of olive and some other oils upon potash. It enters largely into the composition of soaps, forming with potash soft soap and with soda hard soap.

Oleomargarin. See *Butterine.*

Oléron (ō-lā-rōn), an island of Western France, about 1 mi. from the coast of the department of Charente-Inférieure, to which it belongs. Area 96 sq. mi. With the exception of the west side the surface is generally fertile, producing good corn and wine. It has two towns, Château and St. Pierre, the former fortified. The population is about 18,000.

Olaf (or St. Olaf), one of the most celebrated of the Norwegian kings, great-great-grandson of Harald Haarfager, and son of Harald, chief of the district of Gränland. He was a friend of the Normans, and fought as an ally of Ethelred's in England. He afterward established himself on the throne of Norway, and was a zealous supporter of Christianity. Canute the Great having landed in Norway with an army, Olaf fled to Russia, and in attempting to recover his dominions he was defeated and slain at the battle of Stiklestad. Since 1164 he has been honored as the patron saint of Norway. The order of St. Olaf, a Norwegian order given in reward for services rendered to king and country or to art and science, was founded in 1847.

Oliphant, Laurence (1829–1888), son of Sir Anthony Oliphant, chief justice of Ceylon, was b. in England. He studied law at the University of Edinburgh, traveled extensively in Southern Russia and the Crimea; became private secretary to Lord Elgin when he was governor general of Canada, and subsequently accompanied him (1857) on his mission to China and Japan. Returning to Europe he became Paris correspondent to the *Times;* entered Parliament for the Stirling Burghs in 1865, but retired three years later; and, after his attempt to found a Socialistic religious community in Portland, N. Y., had failed, he resided principally in Palestine, near Mount Carmel. Besides frequent contributions to periodical literature he published *Journey to Khatmandu, The Russian Shores of the Black Sea, Minnesota and the Far West, The Transcaucasian Campaign of Omer Pasha, A Narrative of the Earl of Elgin's Mission to China and Japan, Patriots and Filibusters, Piccadilly, The Land of Gilead, Traits and Travesties, Altiora Peto, Masoolam,* and *Scientific Religion.*

Oliphant, Mrs. Margaret (1820-97), maiden name, Wilson, novelist, b. near Musselburgh, Scotland. Her first work of fiction appeared in 1849 under the title of *Passages in the Life of Mrs. Margaret Maitland,* and since then she has maintained a high place as a novelist by such works as *Adam Græme, The Chronicles of Carlingford* (*The Rector, The Doctor's Family, Salem Chapel, The Perpetual Curate*), *The Minister's Wife, Young Musgrave, Squire Arden, At His Gates, A Rose in June, The Beleaguered City, Sir Tom, Lady Car,* etc. Besides this fictional work she has written a *Life of Edward Irving,* a *Life of Francis of Assisi, Memoir of Count Montalembert,* biographies of *Molière, Cervantes,* and *Sheridan, Historical Sketches of the Reign of George II, The Makers of Florence, The Makers of Venice,* a *Literary History of England,* and a *Memoir of Principal Tulloch, Thomas Chalmers* (1896).

Olive, a fruit tree of which there are several species, the most important being the common olive. It is a low branching evergreen tree, in height from 20 to 30 ft., with stiff narrow dusky green or bluish leaves. The flowers are small and white, and appear in June, July, and August. The fruit is a berried drupe of an oblong spheroidal form, with a thin, smooth, and usually blackish skin, containing a greenish soft pulp adherent to a rough, oblong, and very hard stone. It is bitter and nauseous, but replete with a bland oil. The olive is a native of Syria and other Asiatic countries,

and flourishes only in warm and comparatively dry parts of the world. It grows slowly, and is very long lived. The olive tree has in all ages been held in peculiar estimation. It was anciently sacred to Minerva. Olive wreaths were used by the Greeks and Romans to crown the brows of victors, and it is still universally regarded as an emblem of peace. The wood of the olive tree is beautifully veined, and has an agreeable smell. It is in great esteem with cabinetmakers on account of the fine polish of which it is susceptible. But the olive tree is principally cultivated for the sake of its oil, which is contained in the pericarp or pulp. See *Olive oil.* It is cultivated for this purpose in Italy, France, Spain, Malta, European and Asiatic Turkey, the Ionian Islands, etc., and is easily propagated either by seed, grafting,

Common Olive branch in flower; *a.*—ripe fruit; —*b.* section of same showing stone.

or slips. It is very tenacious of life. The fruits are also used at table, not in the natural state, but generally pickled, the green unripe fruits being deprived of part of their bitterness by soaking them in water, and then preserved in an aromatized solution of salt. Another species of olive inhabits China, Japan, and Cochin-China. The flowers are used by the Chinese to mix with and perfume their tea, and also, together with the leaves, for adulterating tea. The only American species is in some districts called *devil wood* on account of the excessive hardness of the wood and the extreme difficulty of splitting it.

Olive Oil, a fixed oil obtained by expression from the pulp of the ripe fruit of the olive. The olives are carried to the presses from the orchards as soon as they are picked, for the sooner the oil leaves the fruit the better it is. The olives are first run into a crushing mill, where they are crushed into pulp. When the pulp is fine enough it is packed into short, open-mouthed baskets of rushes about 20 in. broad and carried to the press. About fifteen of the baskets are piled upon the base of the press and covered on top with a board. Then a big beam is let down and a wooden screen operated by six or eight men is sent grinding down until the rich yellowish green oil bursts through the interstices of the baskets. It oozes down into a trough and drips off into a hogshead filled half full of water. The oil remains at the top, and impurities go through the water to the bottom. The pressure is left on for about five minutes, when a few quarts of boiling water are thrown on to wash off the oil. The screw is then loosened, and the pulp is returned to the stone mill, where it is crushed again for half an hour, and then returned to the press. This process is repeated three times, after which the pulp is taken into a dark room and left for three days. It is then pressed a fourth time, after which it is sold for fuel. About half of the oil is expressed at the first pressing. The oil is placed in unglazed jars. At the end of a week it has cooled and partially clarified, and it is then ready for export. The process of clarification consists in filtering the oil through sand and charcoal until it becomes perfectly golden in color. Much of the oil which purports to be olive oil is made from peanuts. See *Peanut Oil.* California is one of the greatest olive producing regions in the world.

Olives, Mount of (or Mount Olivet), a hill on the east side of Jerusalem, from which it is separated by the valley of Jehoshaphat and the brook Kedron. The principal summit has the name of Mount of Ascension, and here stands the modern Armenian church of that name. But according to the Scriptures the scene of the ascension was near to Bethany (Luke 24: 50), which is on the farther side of the hill from Jerusalem. A short way above Bethany is a nearly flat part of the hill on which hundreds of people might congregate, and there is little doubt that that is truly the place from which our Lord ascended. At the foot of the hill lay the Garden of Gethsemane, and round its eastern and southern side is the road by which our Lord made his triumphal entry into Jerusalem.

Olla Pod'rida, the name of a favorite dish with all classes in Spain. It consists of a mixture of all kinds of meat cut into small pieces, and stewed with various kinds of vegetables. Hence the term is also applied to any incongruous mixture or miscellaneous collection.

Ollivier (o-liv-i-ā), Emile, b. at Marseilles, 1825, studied for the bar and became an advocate at Paris in 1847; took part in the revolution of 1848, and was appointed commissary general at Marseilles under the republic. He afterward entered the legislative assembly, where he became one of the leaders of the Liberal opposition. When the empire was established in France Ollivier gradually severed himself from his former political associates, and the severance was final when he, in January, 1870, accepted Napoleon's invitation to form a ministry. It was this ministry which declared war with Germany in July, 1870, and which, as a result of French disasters, was overthrown with disgrace in August, 1870.

Olmütz (ol'mûts), a city of Austria, in Moravia, 38 mi. n. e. of Brünn, on the March, which forms almost a complete circle around it. It has a cathedral, a fine Gothic building erected by King Wenzel III, who was murdered here in 1306; and its manufactures are chiefly of linen and woolen cloth. Olmütz was formerly the capital of Moravia, and is still the see of an archbishop. It is one of the strongest fortresses in Austria. Pop. 20,176.

Olney, RICHARD, b. in Massachusetts in 1835. He graduated from Brown University at the age of 21, and graduated in law at Harvard in 1859. He was elected to the Massachusetts legislature in 1874 and was a candidate for attorney general on the Democratic ticket. He was appointed attorney general by President Cleveland in his second term and became secretary of state in 1895 on the death of Secretary Gresham.

Olney, Richland co., Ill., on Fox River, 118 mi. e. of St. Louis. Railroads: B. & O.; P. D. & E.; and Chicago branch P. D. & E. Industries: residence town. The town was first settled in 1841 and became a city in 1867. Pop. 1900, 4,260.

Olonetz', a northern government of Russia; area 57,439 sq. mi. The most marked natural feature of the government is its lakes (of which Onega is one), streams, and morasses. Timber constitutes almost the whole wealth of the government. The chief means of support of the inhabitants are forestry, hunting, and fishing. The capital is Petrozavodsk. Pop. 334,658.

Olympia, a locality in Greece, the scene of the famous Olympic games, a beautiful valley or plain lying in the middle portion of the ancient district of Elis, in the western part of the Peloponnesus (Morea). Here were collected thousands of statues of the gods and of victors in the games, treasure houses full of votive offerings, temples, altars, tombs, and in a word the most precious treasures of Grecian art. Among the buildings were the Olympiēum or great temple of Zeus, containing the colossal statue of the god by Phidias; the Heræum or temple of Hera; the Metroum or temple of the mother of the gods; the twelve treasure houses; the Prytanēum, in which the Olympic victors dined after the contests; the Bouleuterion, in which all the regulations regarding the games were made; and these were all surrounded with walls, having a length of about 1,800 ft. and breadth of 1,500. Recent excavations have brought to light numerous valuable fragments of sculpture, bronzes, coins, terra cottas, etc.

Olym'piads, the periods of four years between each celebration of the Olympic games, by which the Greeks computed time from 776 B. C., the first year of the first Olympiad, till 394 A. D., the second year of the 293d Olympiad.

Olympian Games, the most prominent and elaborately observed of all Greek festivals, were celebrated in honor of Zeus, on the plain of Olympia. The "Sacred Grove" containing the sanctuaries connected with the games, enclosed a beautiful spot 660 by 580 ft. in extent, adorned with temples, monuments, altars, theaters, etc., and was crossed by a road called the Pompic Way, along which all the processions passed. Here was located the Olympium dedicated to the Olympian Zeus. The place also contained a colossal statue of the god, the masterpiece of the sculptor Phidias. At first only the Peloponnesus patronized the Olympian games, but gradually the other Greek states adopted them. Originally none but those of pure Hellenic blood were permitted to participate in them, but after the conquest of Greece by the Romans the competition became general, and Roman emperors figured among the lists of victors. The games consisted of running, wrestling, etc., and the victor was crowned with garlands and honored with triumphal processions.

The revival, in 1896, of the Olympic games, after a cessation of exactly 1500 years (the edict of the emperor Theodosius forbidding them having been issued in 396), was an event of historic interest, and gave the modern Greeks a coveted opportunity to compete with other nationalities in the field of athletics. The members of the royal family of Greece participated in the festivities and engaged in the competition for prizes, while the king in person distributed the awards. The stadium erected was an exact reproduction of that of Herodius Atticus, and the arena was capable of seating 70,000 spectators. Among other performances was a long-distance foot-race from Marathon to Athens, for which a special amphora or cup was given, in memory of the plucky runner of old who died in bringing to Athens the news of the rout of the Persians. Bicycle, rowing, and swimming races and other athletics and aquatic sports constituted the festivities of the occasion. It was decided to make the event permanent. The games were held at Paris in 1900, and will be held in Chicago in 1904.

Olym'pias, the wife of Philip II, king of Macedonia, and the mother of Alexander the Great. Her haughtiness, and more probably her infidelity, led Philip to repudiate her, and to marry Cleopatra, the niece of King Attalus. The murder of Philip, which soon followed this disgrace (B. C. 336), some have attributed to the intrigues of Olympias. After the death of her son and his successor Antipater she was besieged by Cassander in Pydna, and, having to surrender, she was put to death after a mock trial (316 B. C.).

Olym'pus, the name given to several mountain ranges by the ancients. The most celebrated of them was situated in Thessaly, at the eastern extremity of the range called the Cambunian Mountains, and now called by the Greeks Elymbos or Olymbos. It rises to the height of 9,700 ft. above the level of the sea, and was the highest mountain in ancient Greece. The earliest Greeks looked upon it as the highest of all mountains, as the central point of the earth's surface, and as the place where the gods dwelt. In after-times, when the ideas of men respecting the universe and the gods were enlarged, the supreme beings were said to reside in the exterior sphere of

the heavens, revolving round the space which embraced the planets; and this new abode of the gods above the firmament of heaven received the name of Olympus. The other most important elevation bearing this name was the Mysian Olympus, a range of lofty mountains in the northwest of Asia Minor, now called Kheshish Dagh, Ala Dagh, Ishik Dagh, and Kush Dagh. Olympus in Cyprus may also be mentioned.

Omaha, Douglas co., Neb., opposite Council Bluffs, Ia., on the Missouri River. Railroads: Missouri Pacific; Union Pacific; C. St. P. M. & O.; F. E. & M. V.; C. B. & Q.; C. R. I. & P.; and the Northwestern and Wabash. It is the headquarters of the Platte Military Department; seat of Creighton College (Catholic), etc.; and is the commercial metropolis of the state. Industries include railroad shops employing 1,000 men, the largest silver-smelting works in the country, employing 500 men, also extensive cattle, hog, and sheep packing houses. It has also white lead factories, foundries, machine shops, breweries and distilleries, linseed oil works, and brick yards employing 2,000 men. The Trans-Mississippi International Exhibition was held at Omaha from June to November, 1898, and proved a success in every way. Pop. 1900, 102,555.

Oman (o-män′) (or Muskat), a sultanate in the southeast of Arabia, partly on the Persian Gulf partly on the Indian Ocean; area est. at 82,000 sq. mi. The chief features of the country are stretches of barren sand or rock, mountains reaching the height of 10,000 ft.; fertile valleys and plains, yielding abundance of grain, sugar, fruits, cotton, coffee, etc., Oman being the richest part of the Arabian peninsula both in agricultural products and in mineral treasures. The inhabitants are mostly Arabs, but there is a considerable mixture of Persians, Hindus, Africans, etc. The form of government is a monarchy (the ruler being styled Imam), limited by a powerful aristocracy with hereditary privileges, and the prescription of popular rights. Zanzibar and its dependencies formerly belonged to Oman. The capital is Muskat. Pop. est. 1,600,000.

Omar I (582–644), successor of Abu-bekr, and second caliph of the Mussulmans after Mohammed. He became a follower of Mohammed about 615, and succeeded Abu-bekr in 634. His caliphate is celebrated for the great extension of Mohammedanism which took place while it lasted. In 638 the conquest of Syria was completed by his general Abu-Ubeida; his general Amru was equally successful in Egypt in 638 to 640; and when in 638 Jerusalem was compelled to surrender, Omar hastened thither himself in order to dictate the terms. Omar's generals likewise invaded Persia, defeated the army of Yezdegered, and conquered the capital and kingdom. The Mussulmans pursued their conquests far into Africa, but Omar did not live long to enjoy his glory. In 644 he was mortally wounded at Medina by a Persian slave. He established the custom of dating from the Hegira.

Omar Khayyam′, Persian poet, astronomer, and mathematician, b. at Nishapur, in Khorasan, d. there 1123 A.D. His scientific works, which were of high value in their day, have been eclipsed by his *Rubaiyat*, a collection of about 500 epigrams in praise of wine, love, and pleasure, and at the same time depressingly pessimistic. A portion of the *Rubaiyat* was translated into English verse by Edward Fitzgerald (1859–79), and a critical text and translation was made by E. H. Whinfield in 1883.

Omar Pasha. See *Omer Pasha.*

Ombay′, an island in the Indian Archipelago, about 18 mi. n. w. of Timor. It is about 1,500 sq. mi. in extent, and is chiefly inhabited by Malays and Papuans. There is a Dutch settlement, with a trade in pepper, birds' nests, etc.

O′mens, certain signs or phenomena supposed to portend some impending good or evil fortune. Among the ancient Romans the taking of omens was a public institution of great importance. See *Augurs, Auspices.*

Omer, St., a town in France, in the dept. of Pas-de-Calais. It ranks as a fortress of the first class, and it has a fine cathedral, and remains of the abbey church of St. Bertin, at one time the noblest Gothic monument of French Flanders. It manufactures woolen cloth, thread, starch, etc., and has an important trade. Pop. 21,556.

Omer Pasha (1806–1871), a Turkish general, b. in the Austrian dominions, d. at Pera. Under his original name of Mikail Lattas he served for some time in an Austrian regiment; fled afterward, for an unknown reason, into Bosnia; adopted the Mohammedan faith; taught writing in a military school; and ultimately became teacher to Prince Abdul-Medjid. When his pupil became sultan, Omer rapidly rose in rank; distinguished himself in the Syrian campaign in 1840; became military governor of Lebanon; quelled various revolts in Bosnia, Albania, etc.; and in the Russian campaign of 1853 he was appointed commander in chief of the Turkish army. In this capacity he made a successful stand against the Muscovite invasion, defeating the Russians at Kalafat on the Danube and at Eupatoria in the Crimea. He retired from public life in 1869.

Ommiades (or Ommeyades) (om′i-ādz), the second dynasty which held the Arabian caliphate until they in turn were superseded by the Abbasides. The founder of the dynasty was Moawiyah, who claimed the throne after the death of Othman, his cousin, and became fully recognized as caliph after the death of Ali his rival and Hussein his son.

Om′phalē, in ancient Greek legend, a queen of Lydia. Hercules was sold to her for a slave by Hermes (Mercury), and performed some remarkable exploits in her service. Omphalē governed with great severity, and was both licentious and cruel.

Omsk, a chief town in the Russian government of Akmolinsk, situated in Western Siberia at the junction of the Om with the Irtish, 280 mi. s.e. of Tobolsk. It is an im-

portant military station, contains a school for interpreters and a military school for the Cossacks, and has a good trade. Pop. 30,890, including many exiles.

One'ga, a river in Russia, which, issuing from Lake Latcha, government of Olonetz, flows first northeast then northwest, and after a course of about 270 mi. falls into the White Sea at the southeast extremity of the Gulf of Onega.

One'ga, a lake in Russia, near the center of the government of Olonetz, and after Lake Ladoga, the largest lake in Europe, covering an area of about 3,800 sq. mi. It has numerous creeks, bays, and islands; is well supplied with fish; and discharges itself into lake Ladoga by the Sveer.

Oneida, Madison co., N. Y., 25 mi. e. of Syracuse. Railroads: N. Y. C. & H. R., and N. Y. O. & W. Industries are flour, planing and knitting mills, steam engine works, etc. Exports include hops and dairy products raised in the vicinity. Pop. 1900, 6,364.

Oneida (o-nī'da), a lake in the state of New York, the western and lower end of which is about 18 mi. s.e. of Lake Ontario. It is 20 mi. long, 4 mi. broad, and its waters find a vent by Oneida River into Lake Ontario at its southeast corner, after they have united with the Seneca and formed the Oswego River.

Oneidas, once a North American Indian tribe inhabiting Central New York. A remnant in Wisconsin are well advanced in civilization.

Oneonta, Otsego co., N. Y., on Susquehanna River, 60 mi. w. of Binghampton. Railroads: D & H. C. C., Albany and Susquehanna division. Industries: railroad shops, milling co., piano factory, and knitting mills. Surrounding country agricultural. Population, 1900, 7,147.

Onion, a well-known plant, the bulbous root of which is much used as an article of food. It is a biennial herbaceous plant with long tubulated leaves, and a swelling, pithy stalk. The peculiar flavor varies much according to the size of the bulb, the small reddish onions having much more pungency than the larger ones. The onion may be grown from the tropics to the coldest verge of the temperate zone. There are at least twenty varieties, the Strasburg, Spanish, and Portuguese being among the most esteemed.

On'kelos, the author of the celebrated *Targum* or Chaldee paraphrase of the Pentateuch which bears his name, is asserted by the *Babylonian Talmud* to have lived in the time of the celebrated teacher Gamaliel, but is supposed from internal evidence to be not earlier than the second and not later than the third century. His version is so faithful, and accords so exactly with the Hebrew text, that it continued till the beginning of the sixteenth century to be chanted in the synagogue alternately with the Hebrew and to the same notes.

Onomac'ritos, a Greek soothsayer and poet, who lived at Athens in the time of the Pisistratidæ, arranged and explained the so-called oracles of Musæus, and having been detected making an interpolation in one of these, was banished from Athens by Hipparchus about B. C. 516. He is supposed to have been the author of the *Orphic* hymns.

Onta'rio, formerly called Upper Canada and Canada West, a province of the Dominion of Canada, having on the n.w., n., and e. Manitoba, Kewatin, James Bay, the Northeast Territory, and Quebec; on the s.e., s., and s.w. the St. Lawrence River, and lakes Ontario, Erie, Huron, and Superior; area 220,000 sq. mi. Besides the great lakes just mentioned, which partly belong to the Dominion and partly to the U. S., Ontario has numerous other lakes, such as Simcoe, Nipissing, Nipigon, and numerous others. The chief rivers are boundary rivers, the Ottawa, Niagara, and Albany, the latter entering James Bay, part of Hudson's Bay. The Falls of Niagara in part belong to the province. There are no mountains of importance. Agriculture is the chief occupation, and for the most part the soil is of excellent quality. A large part of the province is covered with timber, and this, with the water facilities, makes lumbering one of the chief industries. The climate is inclined to the extreme of hot and cold during summer and winter respectively, but the dryness of the atmosphere makes it very healthy. The minerals include silver, copper, iron, gypsum, marble, salt, and petroleum. The richest, most thickly settled, and most highly cultivated portion of the province is the peninsula between the St. Lawrence and lakes Ontario, Erie, and Huron. The crops raised are chiefly wheat, barley, oats, Indian corn, and potatoes, and the fruit-growing farms of some districts yield a plentiful crop of apples, plums, pears, peaches, and grapes. Latterly the farmer here has turned his attention to stock raising and dairy farming with encouraging results, which are largely due to the easy accessibility of markets by rail, supplemented by the lake, river, and canal navigation. Chief among the manufactures are woolens, cotton, linen, hardware, paper, soap, agricultural implements, steam engines, etc. The educational system of the province provides for the free education of all children in the common schools, and there is also liberal government provision for high schools and colleges, technical institutions, and a university; while there are also colleges and universities not under provincial control. The government is administered at Toronto by a lieutenant governor, assisted by an executive council of seven; while there is also a legislative assembly, elected by ballot for four years, and constituting with the lieutenant governor the legislature or parliament. Pop. 1901, 2,182,942.

Ontario, Lake, the most easterly of the great lakes of North America, lying along the northeast side of the state of New York, and forming part of the boundary between the U. S. and Canada; greatest length 190 mi.; greatest breadth about 55 mi.; area 5,400 sq. mi. It receives the waters of Lake Erie by the Niagara, and discharges its waters by the St.

Lawrence into the Atlantic, 1,000 mi. distant. The Hudson, and the Oswego and Erie canals, form a connection through the U. S. between it and the Atlantic. It is navigable throughout its whole extent and at all seasons. The most important places on its shores are Oswego in the U. S., and Toronto, Hamilton, Kingston, and Coburg, in Canada.

Onyx, a semi-pellucid gem with variously colored zones or veins. Any stone exhibiting layers of two or more colors strongly contrasted is called an onyx, as banded jasper, chalcedony, etc., but more particularly the latter when it is marked with white and stratified with opaque and translucent lines. The ancients valued it very highly, and used it much for cameos, many of the finest cameos in existence being of onyx.

Onyx Marble, a very beautiful translucent limestone of stalagmitic formation discovered by the French in the province of Oran, Algeria, and first brought into general notice at the London exhibition of 1862. It is used for the manufacture of ornamental articles.

Oolite (ō′o-līt), a species of limestone composed of globules clustered together, commonly without any visible cement or base. They vary in size from that of small pinheads to that of peas. When the grains are very distinct and well rounded it is called roe stone; when they are large and pea like the rock is known as pisolite, pea grit, or pea stone. What is known as the Oolite or *Oolitic series* of rocks in geology, consist of a series of strata comprehending the whole of those peculiar limestones, calcareous sand stones, marls, etc., which underlie the chalk formation and rest on the Lias.

Oom, Paul. See *Kruger, Paul.*

Oonalashka (or Unalaska), one of the Aleutian Islands (which see).

Oost (ōst), Jacob van (1600–1671), the Elder, one of the best Flemish painters, b. at Bruges. After laying the ground of his artistic education in his native land, he proceeded to Rome, and there became the pupil chiefly of Annibale Caracci. In his youth he was so successful a copyist of Rubens and Vandyck that his copies still deceive connoisseurs.

Ootacamund (or Utakamand), a sanitary station in Southern Hindustan, and the summer headquarters of the Madras government, situated in the Neilgherry Hills, 70 mi. s. of Mysore. It is 7,228 ft. above the level of the sea, and lies in an amphitheater surrounded by noble hills overlooking an artificial lake nearly 1½ mi. long. There are churches, hotels, schools, hospitals, public library, botanic gardens, etc. The mean temperature is about 58° F. Pop. 12,335.

Opah, a large and beautiful sea fish of the dory family, a native of the Eastern seas, but found in the Atlantic and Arctic Oceans. It is about 4½ ft. long and weighs 140 to 150 lbs. Its colors are very rich, the upper part of the back and sides being green, reflecting both purple and gold, and passing into yellowish-green below, the fins bright vermilion. The flesh is highly esteemed.

Opal, a precious stone of various colors, which comes under the class of pellucid gems. It consists of silica with about 10 per cent. of water, and is very brittle. It is characterized by its iridescent reflection of light. It is found in many parts of Europe, especially in Hungary,

Opah.

in the East Indies, etc. The substance in which it is generally found is a ferruginous sandstone. There are many varieties or species, the chief of which are: (*a*) *precious* or *noble opal,* which exhibits brilliant and changeable reflections of green, blue, yellow, and red; (*b*) *fire opal,* which simply affords a red reflection; (*c*) *common opal,* whose colors are white, green, yellow, and red, but without the play of colors; (*d*) *semi-opal,* the varieties of which are more opaque than common opal; (*e*) *hydrophane,* which assumes a transparency only when thrown into water; (*f*) *hyalite,* which occurs in small globular and botryoidal forms, with a vitreous luster; (*g*) *menilite,* which occurs in irregular or reniform masses, and is opaque or slightly translucent. Formerly the opal was believed to possess magical virtues; thus it was believed to confer invisibility when wrapped in a bay leaf.

Open Bill, an African bird of the stork family, so named from the odd formation of the beak, which at the anterior end exhibits a gap between the mandibles as if part of them were worn away though they meet at the points. Their chief food is mollusks, and perhaps this formation of bill has something to do with the opening of the shells. Another species inhabits the East Indies.

Op′era, a musical drama, that is, a dramatic composition set to music and sung on the stage, accompanied with musical instruments and enriched by the accessories of costumes, scenery, dancing, etc. The component parts of an opera are recitatives, solos, duets, trios, quartettes, choruses, etc., and they are usually preceded by an instrumental overture. The lighter kind of opera as the French *opéra comique,* is of a mixed kind — partly spoken, partly sung. The chief varieties of opera are the *grand opera* or *opera seria,* the name given to that kind which is confined to music and singing, of which the recitative is a principal feature; the *romantic opera,* or *opera drammatica* of the Italians, embracing an admixture of the grave and lively; the *comic opera,* or *opera buffa;* as well as many intermediate varieties. Though the Greek dramas were operatic in character, the opera proper is of modern date

and of Italian origin, and would seem to have developed naturally from the miracle play of the Middle Ages, the first operas dating from the sixteenth century. About the close of this century the poet Rinuccini wrote a drama on the classical story of Daphne, which was set to music by Peri, the most celebrated musician of the age. The orchestra of this first opera consisted of four instruments, namely, a harpsichord, a harp, a viol di gamba, and a lute. There was no attempt at airs, and the recitative was merely a kind of measured intonation. Monteverde, a Milanese musician, improved the recitative by giving it more flow and expression; he set the opera of *Ariadne*, by Rinuccini, for the court of Mantua; and in the opera of *Giasone* (Jason), set by Cavalli and Cicognini, for the Venetians (1649), occur the first *airs* connected in sentiment and spirit with the dialogue. The first regular serious opera was performed at Naples in 1615, and was entitled *Amor non ha ♭Legge*. The first *opera buffa* is said to have been represented at Venice in 1624, where also the first stage for operas was erected in 1637. In 1646 the opera was transplanted to France by Cardinal Mazarin, about the same time to Germany, and somewhat later to England. In France there arose Lulli; in Germany, Keiser; in Italy, Scarlatti; and in England, Purcell, who are the chief operatic composers of the second half of the seventeenth century. The chief Italian operatic composers include, besides those already mentioned, Piccini, Jomelli, Cimarosa, Paisiello, in the last century, and Cherubini, Rossini, Bellini, Donizetti, Verdi, etc., in the present. Among the French composers are Grétry, Monsigny, Rousseau, Méhul, belonging to the eighteenth century, Boieldieu, Auber, Halévy, Herold, A. Thomas, and Gounod to the nineteenth. The chief recent composers of French comic operas are Offenbach, Lecoq, Hervé, and Bizet. Among American composers of operas may be mentioned Reginald de Koven, Damrosch, Sousa, Fry; and of English composers of the present or recent times Balfe, Wallace, Macfarren, Sullivan, Mackenzie, Thomas, and Stanford. It is the German composers, however, who have raised opera to the highest pitch of perfection, the list including such names as Handel, Gluck, and Mozart in the last century, Beethoven, Weber, Flotow, etc., in the present. Meyerbeer, though German by birth, is to be classed rather with the modern French composers. In the most recent school of German operatic composition, at the head of which stands Richard Wagner, the vocal music of the piece is deprived of the prominent place formerly assigned to it, and is made subordinate to the other three elements —text, instrumentation, and scenic decoration.

Opéra Bouffe (bu̇f), a farcical form of *opera buffa* in which the characters, subject matter, and music is intended to burlesque the more serious style of opera. Offenbach was the creator as well as the chief master in this art. The comic operas of Gilbert and Sullivan, both in the character of the music and the libretti, stand by themselves.

Ophicleide (of′i-klīd), a brass wind instrument of music invented to supersede the serpent in the orchestra and in military bands. It generally consists of a wide conical tube, terminating in a bell like that of a horn, with a mouthpiece and ten holes or ventages which are stopped by keys. Ophicleides are of two kinds, the bass and the alto; the former has a compass of three octaves and one note, ranging from B on the third space below the bass staff to C on the third space of the treble staff, including all the intermediate semitones. The alto ophicleide (an inferior instrument) has the same extent of compass but starts an octave higher.

O′phir, a country or city to which the Hebrews made voyages in the time of Solomon, bringing home gold, almug wood, and precious stones. Some identify it with the Ophir mentioned in the Bible, which was apparently situated in Arabia; while others place it in India, or in Africa.

Oph′ite, green porphyry or serpentine, a metamorphic rock of a dusky-green color of different shades, sprinkled with spots of a lighter green. It is a hydrous silicate of magnesia with alumina and iron. Called also *Ophiolite.*

Ophthalmoscope, an instrument for observing the internal structure of the eye. It consists of a mirror (plane in that of Coccius, concave in that of Desmarres), by which light from an artificial source is directed into the eye of the patient, and a double convex lens by which the illumined parts of the structure of the eye are magnified in order that they may be more easily examined, the observer looking through a hole in the center of the mirror. The light is usually placed to the side of and slightly behind the patient's head.

Opinion of Counsel, the advice given by a barrister or advocate in answer to questions put with regard to a "case" or "memorial" prepared by an attorney or solicitor.

Opitz (or Opitius) Martin (1597–1639), German poet. He studied at Frankfort-on-the-Oder and at Heidelberg, and having afterward visited Holland he went in 1621 to the court of the Duke of Liegnitz, whence in about a year he removed to become professor of philosophy and classical literature at the University of Weissenburg (now Karlstadt). Becoming distinguished for his talents, he went in 1625 to Vienna, where the Emperor Ferdinand II bestowed on him the poetical crown and letters of nobility, when he assumed the title of Von Boberfeld. Among his works are a poem on *Mount Vesuvius*, *Silvæ*, *Epigrams*, etc.; but he is more important for the influence of his teaching regarding correctness in poetic style than for his own poems.

Opium, the inspissated juice of a species of poppy, cultivated on a large scale principally in Hindustan and in Asiatic Turkey, but well known in many places as a garden plant, being an annual with white, red, or violet flowers and glaucous leaves. The opium is the juice that flows from incisions made in the green heads or seed capsules after the fall or removal

of the petals, and the best of the plant flows from the first incision. The juice is at first a milky liquid, but soon solidifies and turns black, and is then scraped off and collected. It is one of the most energetic of narcotics, and at the same time one of the most precious of all medicines, and is employed in a great variety of cases, but most commonly for the purpose of procuring sleep and relief from pain. In medicine it is very commonly used in the form of *laudanum*, which is a simple tincture or extract in spirits of wine; it is also an ingredient in various *patent* and other remedies. Another opium preparation is *morphine* (which see). In its natural state opium is heavy, of a dense texture, of a brownish-yellow color, not perfectly dry, but easily receiving an impression from the finger; it has a faint smell, and its taste is bitter and acrid. The chief active principle of opium is morphia, or morphine in combination with meconic acid. The principal part of our supply of opium is brought from Turkey, whence it is imported in flat pieces or cakes, covered with leaves. In the case of many temperaments opium produces such agreeable effects, whether a delightful dreamy calm, a state of pleasant exhilaration, or beatific visions, that numbers of persons are led to use it habitually, as others use alcohol in some form, though over-indulgence in it is attended with at least as evil effects as over-indulgence in the latter. But like tobacco it is taken by vast numbers without any apparent result one way or other. Some habitual takers of opium can take as much in a day as would kill ten or twenty persons unaccustomed to it. It is taken in two ways, known as opium-eating and opium-smoking. The habitual use of opium is most common in China, the southeast of Asia, and the Malay Archipelago, where it is chiefly smoked in a special pipe. The pipe, or rather the stem of the pipe, is about the length and size of an ordinary flute; the bowl is generally made of earthenware. The smoker, who is always lying, or at least reclining, takes a small portion of opium about the size of a pea on the end of a spoon-headed needle, heats it at a lamp, and then places it in the bowl of the pipe, the pellet of opium having previously been perforated with the needle. He then brings the opium to the flame of the lamp, inhales the smoke in several inspirations, and is then ready to repeat the process with a fresh quantity of opium until the desired intoxication ensues. Large quantities of opium are consumed in China, a great part of which comes from India, though probably as much or more is also produced in China itself. The Indian opium, however, is preferred to their own by the best judges among the Chinese.

Opor'to (Portuguese, *O Porto*, the port), a large city and seaport of Portugal, the second in the kingdom, capital of the province of Entre Douro e Minho, on a steep declivity on the right bank and about 2 mi. from the mouth of the Douro, 170 mi. n. of Lisbon. The river is crossed by two iron bridges of recent construction, one of them, the railway bridge, especially bold and striking. Among the chief buildings are the Gothic cathedral, the church of S. Francisco (Gothic), the bishop's palace, an enormous building, the exchange, and the Torre dos Clerigos, a granite tower 210 ft. high. There are also museums, a large library, medical college, Crystal Palace, and fine garden, etc. The principal trade is in wine, white and red, but chiefly the latter (*port* wine, so named from this town). There are some manufactories of hats, silks, cotton, woolen, and linen stuffs, pottery, lace, glass, leather, and paper, etc. Oporto was at one time the capital of Portugal. In 1809 Wellington drove the French out of it after the remarkable passage of the Douro. Pop. 105,838.

Opos'sum, the name of several species of *Didelphys*, a genus of mammals, having four *hands* and a long prehensile tail. They are nocturnal animals, living constantly on trees, and there pursuing birds, insects, etc., although they do not despise fruit. The females of certain species have an abdominal pouch in which are the mammæ, and in which they can enclose their young. The best-known species of opossum is the *Didelphys virginiana*,

Virginian Opossum.

very common in the U. S. It is almost the size of a large cat, the general color whitish gray, and the whole hair of a wool-like softness. On the ground the motions of the opossum are awkward and clumsy, but on the branches of a tree it moves with great celerity and ease, using the prehensile tail to assist its motions. When caught or threatened with danger the opossum counterfeits death, and "playing 'possum" has on this account passed into a proverb as used to indicate any deceitful proceeding. The female has from ten to fifteen young, which are for a long time nourished in the pouch, to which they resort when alarmed.

Oppenheim (-hīm), an old town of Germany, in Hesse, on the left bank of the Rhine, 12 mi. s. of Mainz, on the slope of a hill abounding in vineyards, a place of considerable historical importance in the Thirty Years' War and later. Pop. 3,452.

Oppian, the name of two Greek authors, one of whom wrote a poem entitled *Halieutica* (Fishing), and the other a poem on *Cynegetica*

(Hunting). The author of the *Halieutica* flourished about 170 A.D. His poem consists of about 3,500 lines, divided into five books. The author of the *Cynegetica* was b. at Apamea or Pella, in Syria, and flourished about 210 A.D. His work, which was dedicated to the Emperor Caracalla, is composed of four books containing 2,100 hexameter lines. There is also a prose paraphrase of a poem on *Hawking*, attributed to Oppian; but it is doubtful to which of the two it belongs.

Ops, the Roman female divinity of plenty and fertility. She was regarded as the wife of Saturn, and, accordingly, as the protectress of everything connected with agriculture.

Optics is the branch of physics which treats of the transmission of light, and its action in connection with the laws of reflection and refraction, including also the phenomena of vision. A *ray* of light is the smallest conceivable portion of light, and is represented by the straight line along which it is propagated. A *pencil* of light is a collection of such rays; it is *parallel* when all the component rays are parallel to each other; *converging* when they all proceed to a single point; and *diverging* when they all proceed from a single point. The *focus* of the pencil is the point to or from which the rays proceed. Any space or substance which light can traverse is in optics called "a medium." When light falls on any surface a certain portion of it is *reflected* or sent back, and it is owing to this reflected light that objects are visible. When light falls upon the surface of a solid substance or medium that it can traverse (a transparent substance), one portion greater or less is directed or reflected back into the medium whence it came; another portion is transmitted through the solid medium, but undergoes a change called *refraction;* while a third portion is absorbed in the new medium. When all the minute parts of a surface give out rays of light in all directions we call it a luminous surface, whether it is self-luminous or is merely reflecting the light from a self-luminous body such as the sun. The *law of reflection* is that the angle of incidence and that of reflection are in the same plane, and that the angle of reflection is equal to the angle of incidence, and on the opposite side of the perpendicular. This law holds true whatever be the nature of the reflecting surface or the origin of the light which falls upon it. *The law of refraction* comes into operation when a ray of light passes through a smooth surface bounding two media not homogeneous, such as air and water, or when rays traverse a medium, the density of which is not uniform, as the atmosphere. When the ray of light passes from a rarer into a denser medium, it is bent or *refracted* toward the perpendicular line drawn through the point of incidence, or the angle of refraction is less than the angle of incidence. On the contrary, when a ray of light passes from a denser into a rarer medium the refraction is from the perpendicular, or the angle of refraction is greater than the angle of incidence.

The law of reflection is illustrated especially by the action of mirrors. When a pencil of rays from a luminous point falls on a plane mirror each ray is reflected according to the law given above, and it is easy to show by geometry that the pencil which was divergent before incidence has exactly the same divergence after reflection; but the rays now seem to have proceeded from a point behind the mirror. This point is called the "virtual image" of the first point (being not a *real* image of it); the line joining the points is at right angles to and is bisected by the mirror. Now a luminous object is made up of points, each of which sends a divergent pencil to the mirror, which seems after reflection to proceed from a point behind the mirror, and hence a luminous object sends rays to a plane mirror which after reflection seem to have proceeded from a luminous object behind the mirror. An eye receiving a ray (or a small pencil of rays) gets the impression that the luminous point from which it was sent is somewhere in the line of the ray just before reaching the eye, and hence an eye in such a position as to receive after reflection a few rays from every point of the object sees the image of the object. Besides plane mirrors concave and convex mirrors are often used in optics. When a mirror is not plane the incident rays from a luminous point in general neither converge to a singe point after reflection nor diverge as if they had come from a virtual image. But when a concave mirror forming a small portion of a spherical surface is used we find that all the rays falling upon it from a luminous point converge so nearly to a luminous point after reflection that their "aberration" (as the non-convergence of the rays is called) may be neglected in practise. The line joining the center of the spherical surface with the "pole" of the mirror (that is, the middle point of the reflecting surface) is called the *principal axis.* Any bundle of rays parallel to the principal axis converges after reflection to a point in the axis called the *principal focus;* and any bundle of parallel rays converges after reflection to a focus which is at the same distance from the mirror as the principal focal distance. When the object from which the rays proceed is at a considerable distance, an inverted image of it will be formed midway between the center of curvature and the mirror. When the object is only at a moderate distance, but exceeding half the radius of curvature, an inverted image is still formed in front of the mirror, being diminished when nearer the mirror than the object is, and magnified when farther away than the object. The image of an object placed nearer a concave mirror than the principal focus is erect and larger than the object and is virtual. The image of any object in a convex mirror is also virtual and erect; it is, however, smaller than the object.

When the two faces of a piece of glass through which light is refracted are both of them plane, it is called a *plate* if they are parallel, and a *prism* if they are not parallel. When the faces are curved, or one of them

curved and the other plane, it is called a *lens*. Prisms are the essential parts of the apparatus used for decomposing light and examining the properties of its component parts, as in spectrum analysis. See *Light*. A lens may be regarded as consisting of an unlimited number of prisms, the angles between their faces gradually diminishing the farther away from the axis of the lens. It is the property of convex lenses to diminish the divergency of the pencils of light, of concave lenses to increase that divergency. It is the duty of a convex lens to make rays parallel to the axis falling on one face of it converge accurately to one point after emerging from the other face. This point is called the principal focus, and is the point where a "real" image would be formed. When rays parallel to the axis pass through a concave lens they diverge, and if produced backward in the direction from which they come they would meet at one point, which in this case also is called the principal focus; but it is only a virtual focus, because the rays themselves do not pass through it, but only their backward productions. Thus concave lenses bend rays from the axis, and convex ones bend them toward it. When we look through a concave lens it makes objects seem smaller whatever their distances are. When we look through a convex lens at an object between the lens and the principal focus it appears larger than it really is, and hence the use of such lenses in magnifying glasses, microscopes, and telescopes. *Convex* lenses are used in spectacles for long-sighted (or *old*-sighted) persons, because the lens of their eye is too much flattened, and does not of itself cause a sufficient convergency of the rays to make an image on the retina, but one that would fall behind it. *Concave* lenses, again, are used by near-sighted persons, because the rays in their case converge so much as to make an image in front of their retina instead of on it.

Op'timism, that philosophical doctrine which maintains that this world, in spite of its apparent imperfections, is the best possible. It is an ancient doctrine; among modern philosophers Leibnitz is its principal advocate.

Or, in heraldry, the tincture that represents gold. See *Heraldry*.

Orach (Orache) (or'ach), is the popular name of several plants with mealy foliage, generally growing near the sea. A cultivated species is known as garden or mountain spinach, being used like spinach.

Or'acles, the answers which the gods of the Greeks, Romans, Egyptians, etc., were supposed to give, by words uttered or otherwise, to those who consulted them upon any occasion; also the places or sources whence these answers were received. The credit of oracles was so great that vast numbers flocked to them for advice. Scarcely any war was waged, or peace concluded, or new form of government instituted, or new laws enacted, without the advice and approbation of some oracle. The Greek oracles were the most celebrated, the earliest being that of Zeus (Jupiter) at Dodona. Of other gods Apollo had many oracles, but that at Delphi held the first place, and it was often applied to for explaining obscure answers obtained at Dodona. Another famous oracle of Apollo was in the island of Delos. The Romans had no important oracles of their own, but had recourse to those of Greece and Egypt. They long maintained their standing, and sunk only with the freedom and independence of Greece. Under the reign of Theodosius the temples of the prophetic deities were closed or demolished.

Oran', a seaport of Algeria, capital of province of same name. The town rises in the form of an amphitheater, has now largely a European character, and is strongly fortified. The harbor was formerly at Mers-el-Kebir, about 5 mi. n.w. of the town, but recently excellent accommodation for shipping has been provided at Oran itself. Oran has a large trade. Chief exports: cereals, esparto and alfa grass, wine, olives, etc. Pop. 67,681, of whom about three fourths are Europeans.

Orang' (or Orang-outang), a mammal, one of the anthropoid or man-like apes or monkeys. This animal seems to be confined to Borneo, Sumatra, and Malacca. It is one of those animals

Orang-outang.

which approach most nearly to man, being in this respect only inferior to the chimpanzee and gorilla. It is utterly incapable of walking in a perfectly erect posture. Its body is covered with coarse hair of a brownish-red color; in some places on its back it is 6 in. long, and on its arms 5 in. The face is destitute of hair save at the sides. It attains a height of from 4 to 5 ft., measured in a straight line from the vertex to the heel. The arms reach to the ankle joint. The hind legs are short and stunted, the nails of the fingers and toes flattened. They swing themselves along from tree to tree by the aid of their long arms, but

their gait on the ground is awkward and unsteady. At birth the head of the orang resembles that of a young child. These apes are remarkable for strength and intelligence, and are capable of being highly domesticated if captured young. They feed chiefly on fruits and sleep on trees. See also *Man*, *Apes*, *Monkeys*.

Orange, the fruit of the *Citrus Aurantium*, and the shrub or tree itself. The orange is indigenous in China, India, and other Asiatic countries, and was first introduced in Portugal about 1520. It is extensively cultivated in the U. S., especially in Florida and California. Large quantities are also produced in the Azores, in Africa, and the West Indies, in Australia, and the Pacific Islands. The tree is a middle-sized evergreen, with a greenish-brown bark.

Sweet Orange, Branch and Flower. —*a.*—fruit; *b.*—transverse section of same. (Bentley and Trimen.)

The flowers are white. The fruit is globose, bright yellow, and contains a pulp which consists of a collection of oblong vesicles filled with a sugary and refreshing juice; it is divided into eight or ten compartments, each usually containing several seeds.. The principal varieties are the common sweet, or China orange, the bitter or Seville, the Maltese, or red pulped, the Tangerine, the Mandarin, or clove, and the St. Michael's. The leaves, flowers, and rind yield fragrant oils much used in perfumery, and for flavoring essences. The wood is fine grained, compact, susceptible of a high polish, and is employed in the arts. The citron and lemon are allied fruits.

Orange, a small and ancient principality in Southeastern France, which from the eleventh to the sixteenth century had its own princes. By the peace of Utrecht (1713), it was ceded to France. The reigning dynasty of the Netherlands is of the house of Orange, and the heir-apparent bears the title of Prince of Orange.

Orange, Essex co., N. J., 12 mi. w. of N. Y. Railroads: Erie, and D. L. & W. Industries include the manufacture of hats and carriages. Pop. 1900, 24,141.

Orange Free State, now the Orange River Colony. It has Cape Colony on s. and s. w., Bechuanaland on n.w., Transvaal on n., Natal on e., Basutoland on s.e.; area est. at 70,000 sq. mi., divided into several districts; pop. 150,000, of whom about 60,000 are whites. It was founded in 1835–36 by Dutch settlers from Cape Colony, annexed by Britain in 1848 in order to put a stop to the Boer outrages upon natives; but in 1854 it was recognized as an independent state. Lying about 5,000 ft. above the sea level, the country, chiefly vast undulating plains, is cold in winter, with violent thunderstorms and long droughts in summer. It is, however, very healthy, and favorable to European constitutions. Pasturing is the chief occupation, and wool, hides, and ostrich feathers the principal exports. Diamonds and other precious stones have been found in paying quantities, rich coal-mines exist, and the state is said to abound in other mineral wealth. Gold was discovered in 1887. The executive was vested in a president and a council; the legislative functions in the Volksraad, an assembly of fifty-six members, elected by universal suffrage. The Dutch Reformed Church is the dominant religion, and a Dutch dialect the language of the country. Capital, Bloemfontein, pop. 3,270. It was annexed to the British Empire in 1900. See *Transvaal.*

Orange Lily, a species of lily having a scaly bulb, a leafy stem 2½ ft. high, small dark-brown bulbs in the axils of the leaves, and large orange-colored flowers.

Orangemen, the members of a secret society founded in the north of Ireland in 1795, to uphold the Protestant religion and political ascendancy, and to oppose the Catholic religion and influence and their secret societies. The title of the association was adopted in honor of William III of England, prince of Orange. The head of the association is the Imperial Grand Lodge with its imperial grand master; then there are grand lodges, grand county lodges, district and subordinate lodges, spread over Ireland, Great Britain, some of the colonies, especially Canada, and also the U. S., but the chief strength is in the north of Ireland. In 1835 the society was dissolved in consequence of intrigues in the army, but revived in 1845. Great demonstrations take place annually on July 12, the anniversary of the battle of the Boyne, and where the Catholic and Protestant parties are both in considerable strength the processions of either party are the cause of serious disturbances.

Orange River (or Gariep), a river in South Africa, forming part of the north boundary of Cape Colony, and falling after a total course of about 650 mi. into the Atlantic. It is formed by the junction of the Ky Gariep, or Vaal River, with the Nu Gariep, Black or Cradock River, both of which have their sources in the Drakensberg or Quathlambu Mountains, near the same locality. Its volume varies greatly, and it is of no use for navigation.

Orato′rio (Italian, *oratorio*, a small chapel, the place where these compositions were first performed), a sacred musical composition consisting of airs, recitatives, duets, trios, quartettes, choruses, etc., with full orchestral and sometimes organ accompaniment, the subjects being generally taken from Scripture. Its origin has been usually ascribed to St. Filippo de Neri, who, in 1540, founded the congregation of the Oratory in Rome, one of the objects of

which was to render religious services as attractive as possible. Its increasing popularity induced poets of eminence to supply texts for these works, and Metastasio wrote a number of oratorios. Among the most notable productions are the *Messiah* and *Israel in Egypt*, by Handel; the *Creation*, by Haydn; the *Mount of Olives*, by Beethoven; the *Last Judgment*, by Spohr; *Saint Paul* and *Elijah*, by Mendelssohn. Among the oratorios by living composers are *Saint Peter*, by John Knowles Paine; *The Light of the World* and *The Prodigal Son*, by Sir Arthur Sullivan; *The Rose of Sharon*, by A. C. Mackenzie; *The Deluge* and *Ruth*, by F. H. Cowen.

Orcagna, (or-kän'yȧ), Andrea di Cione (1308–1386), one of the greatest of the early Florentine artists after Giotto. Painting, sculpture, architecture, and mosaic work were all within the sphere of his artistic genius; and his productions compare favorably with the best of a period so rich and distinguished in the art of Italy. As a painter he executed the beautiful frescoes in the church S. Maria Norella at Florence; the chapel San Michele and its magnificent tabernacle in the same city are grand memorials of his architectural and sculptural talent. His style is remarkable for exquisite design, graceful pose, and delicate execution. Boccaccio has perpetuated his name in his *Decamerone.*

Orchard, an inclosure devoted to the culture of fruit trees, especially the apple, the pear, the plum, the peach, and the cherry. The most suitable position for an orchard is a declivity lying well exposed to the sun and sheltered from the colder winds, but yet not too much shut in. The soil should vary according to the kind of fruit cultivated, and it is generally allowed to produce only grass besides the fruit trees. Fruit cultivation is carried on most extensively on the continent of Europe and the U. S.; but in Great Britain the area of orchards is comparatively limited, although the flavor of the fruit produced is of the very best. The chief fruit-growing states are New York, Ohio, Michigan, Illinois, Pennsylvania, Delaware, New Jersey, Maryland, Indiana, and California. The largest orchard in the world is in Santa Barbara, California. It extends to 1,700 acres, and contains 10,000 olive trees, 3,000 English walnut trees, 4,500 Japanese persimmon trees, 10,000 almond trees, and about 4,000 other fruit and nut trees. This orchard is said to bring the owner an income of not less than $750 per acre.

Orchardson, William Quiller, R. A., subject painter, b. in Edinburgh 1835. He painted portraits and exhibited in the R. S. A. till 1863, when he removed to London. He became an associate of the Royal Academy in 1868, and full academician in 1879. He is among the first of British incident painters, a fine colorist, and most of his works are skillfully dramatic and picturesque. Among his more notable pictures are *The Challenge*, *Christopher Sly*, *The Queen of the Swords*, *Napoleon on Board the Bellerophon*, *Un Mariage de Convenance*, *Salon of Mme. Recamier*, *The First Cloud*, and *The Young Duke.*

Orchella (or-kel'ȧ), name of several species of *Roccella*, a genus of lichens, originally brought from the Levant, and employed from very early times as a dye agent. Large quantities are gathered in the maritime rocks of the Canary and Cape Verd Islands. A purple and a red dye, known as orchil or archil, are prepared from them.

Orchestra (or'kes-tra), the space in theaters between the seats occupied by the spectators and the stage, appropriated by the Greeks to the chorus and the musicians, by the Romans to the senators, and in our modern theaters to the musicians. The name is also used for the part of the concert rooms assigned to the vocal and instrumental performers; and, finally, is applied to the instrumental performers, collectively taken. A modern orchestra in the last sense consists of stringed, wind, and percussion instruments, in varied proportions, according to the number of instrumentalists.

Orchids (or Orchidaceæ) (or-ki-dā'sē-ē), an extensive order of endogens (nearly 2,000 species being known), consisting of herbaceous plants or shrubs, with fibrous or tuberous

Orchid.

roots, and showy flowers. They are natives of all countries, but very cold and dry climates produce but few species; some of them grow in the ground, but a large number are epiphytes, growing upon trees; and it is above all in the great virgin forests of South America and of the East Indies that the orchids abound. The orchids attract much attention, and are cultivated with zeal on account of the beauty or curious shapes of the flowers (which often assume the forms of reptiles, insects, and other denizens of the animal kingdom), or for their, not infrequently, fragrant smells. The cultivation of orchids has of recent years become a sort of mania, large sums being often paid for new or rare varieties. The nutritive substance called salep is prepared from the roots and tubers of several species; the fragrant vanilla is obtained from two species of a genus of that name. See colored plate, Flowers.

Orcin (or Orcine), a peculiar coloring matter obtained from orchella. When exposed to air charged with vapors of ammonia it assumes by degrees a fine violet color; when dissolved in ammonia it acquires a deep blood-red color.

Ordeal, an ancient form of trial to determine guilt or innocence, practised by the rude nations of Europe, in the East, and by the savage tribes of Africa. There were two principal kinds of ordeal, *fire ordeal* and *water ordeal;* the former being confined to persons of higher rank, the latter to the common people. Both might be performed by deputy, but the principal was to answer for the success of the trial. Fire ordeal was performed either by taking in the hand a piece of red-hot iron, or by walking barefoot and blindfold over glowing coals, or over nine red-hot plowshares laid lengthwise at unequal distances; and if the person escaped unhurt, he was adjudged innocent, otherwise he was condemned as guilty. Water ordeal was performed either by plunging the bare arm to the elbow in boiling water, escape from injury being considered proof of innocence; or by casting the person suspected into a river or pond, and if he floated without an effort to swim it was an evidence of guilt, but if he sunk he was acquitted. As success or failure, except in a few cases, depended on those who made the requisite preparations, a wide field was opened to deceit and malice. Besides these ordeals there were a variety of others practised in many countries, such as the corsned or hallowed morsel trial, the trial by touching the dead body of a person murdered, which was supposed to bleed if touched by the murderer, the ordeal by swallowing certain herbs and roots, etc. After the fourteenth century ordeals became more and more uncommon. In the sixteenth century only the trial of the bier was used, and this continued even into the first part of the eighteenth. In consequence of the prevalent belief in sorcery or witchcraft the ordeal by cold water was long retained in the trials of witches. These foolish customs were gradually done away, but isolated cases in some of the benighted countries of Europe happened until a comparatively recent period. Ordeals are still found in many nations out of Europe, as in West Africa and other parts of that continent. In Madagascar till lately trial by ordeal (swallowing the poison of the tree *Tanghinia venenōsa*) was in regular use. The Chinese still retain the ordeal of fire and water, and various ordeals are practised among the Hindus.

Ordeal Root, the root of a species of plant of the genus *Strychnos*, used as an ordeal in West Africa.

Or'derlies, in the U. S. army, are privates and non-commissioned officers selected to attend upon general and other officers, for the purpose of bearing their orders and rendering other services. The *orderly officer*, or officer of the day, is the officer of a corps or regiment, whose duty is to superintend its interior economy, as cleanliness, quality of the food, etc. An *orderly book* is provided by the captain of each company or troop, in which the general or regimental orders are entered.

Order of the Day, in legislative language, is a bill or other matter which the House has ordered to be discussed on a particular day.

Orders, Military, fraternities, or societies of men banded together in former times for military and partly for patriotic or Christian purposes. Free birth and an irreproachable life were the conditions of admission. The chief were the Templars, the Teutonic Knights, and the order of St. John of Jerusalem.

Orders, Religious. See *Monasteries and Monachism.*

Ordinary, in common law, one who has ordinary or immediate jurisdiction, in matters ecclesiastical, in any place. As a nautical term an *ordinary* seaman is one not qualified to take the helm or sail the ship, and is thus distinguished from an *able* seaman.

Ordnance. See *Cannon, Artillery, Howitzer, Mortar*, etc.

Ordnance Department, in the U. S. the Department of Ordnance is attached to the War Department, and has a Chief of Ordnance, with a large force of officers and clerks at an annual cost in salaries of $175,000.

Ore, the compound of a metal and some other substance, as oxygen, sulphur, or carbon (forming oxides, sulphides, carbonates, etc.), by which its distinctive properties are disguised or lost. Metals found free from such combination and exhibiting their natural character are called *native.* Metals are commonly obtained from their ores by smelting, the ores having been previously oxidized by *roasting.* Ores are commonly found in veins or lodes. See *Mining.*

Oregon, the *Beaver State*, one of the Pacific states, is bounded on the n. by Washington, on the e. by Idaho, on the s. by Nevada and California and on the w. by the Pacific Ocean. Its average length from e. to w. is 345 m., the average width from n. to s., 276 m., and the total area, 97,030 sq. m. In 1900, the population was 413,536, of which 10,397 are Chinese and 4,957 Indians.

Surface.—The surface of Oregon is considerably broken. There are two great mountain chains: the Coast Range, running from n. to s. not far from the coast, and, about 70 m. to the e.; and the Cascade Range, surmounted by snow-capped peaks reaching an altitude of 15,000 ft. Between these ranges lie fertile valleys and plateau lands, and eastward from the Cascades extend vast wheat and pasturage areas for a distance of over 200 m. The principal rivers are the Columbia and Willamette.

Climate.—The mildness of the climate is due in part to the warm winds which blow inland from the ocean during the winter months. The range of temperature from summer to winter is small. On the coast, especially, is this true. Here the summers are foggy and the winters are unusually rainy because of the moisture precipitated by the warm ocean winds breaking against the Coast Range. In the valleys between the two ranges there is

considerably less, though abundant, rainfall. The summers are pleasant, the winters wet. In eastern Oregon the rainfall is less than half of that in the western valleys, the summer heat is greater, the temperature in winter is at times below zero, and the snowfall is considerable.

Mining.—As in the other states of the northwest, the mineral resources of Oregon are rich and varied. In eastern Oregon are especially valuable gold fields. Borax, iron ore, copper and nickel are other important mineral products. In 1900 the yield of gold valued $3,770,000; of silver, $15,000; and of coal, $270,000.

Agriculture.—The slopes of the Coast Range and of the Cascades are heavily wooded. The valley region of western Oregon produces a quantity and quality of fruit not often equalled. The eastern portion of the state is remarkable for its great wheat production. As a hop-growing state, Oregon ranks among the first. Although the number of herds is diminishing, the raising of live-stock is of the first importance. The value of the wool clip for 1900 was $2,500,000, and of the sales of stock, $10,500,000. Dairying, especially in the coast regions, is a profitable industry. During 1900, the cheese, milk and butter products were valued at $5,113,013.

Fisheries.—Fishing is another of Oregon's leading industries, the value of the fish caught and packed during 1900 being $2,212,307.

Manufactures.—The principal manufactures include flouring and grist mill products, lumber and timber products, furniture, car construction and railway repairs, and foundry and machine-shop products. The total value of the manufactures for 1900 was $46,000,587.

Transportation.—Oregon has a railway mileage of nearly 2,000. The principal systems are the Southern Pacific, Oregon Pacific and Oregon Railway and Navigation Co. Steamers ply on the Columbia and Willamette, and for short distances on some of their tributaries. Around the Cascades, the state has built a portage railway, and the U. S. government has built a canal and locks costing over $2,000,000. The Willamette river is obstructed at Oregon City by falls 41 ft. high, around which a canal and locks have been constructed by the state.

Education.—The leading educational institutions are the State University at Eugene, the State Agricultural College at Corvallis, and the state normal schools at Monmouth, Weston, Ashland and Drain. The common school system is carefully organized. The sum of $1,728,224 was, during 1900, devoted to its maintenance. Among the many denominational institutions, Willamette University at Salem is prominent. The State Reform School, Oregon Institute for the Blind and State Insane Asylum are at Salem.

History.—Drake discovered the coast of Oregon in 1579, and two centuries later, 1792, Vancouver surveyed the entire coast and ascended the Columbia river. Astoria was established in 1811, by John Jacob Astor; two years later it was sold to the Northwestern Fur Company and afterwards passed into the hands of the Hudson Bay Company. In 1832, settlement by New Englanders began, and in 1848 Oregon became a territory. Eleven years later admission into the Union was granted and the boundaries were somewhat reduced. Oregon has always enjoyed exceptional prosperity. The principal cities, with their population in 1900, are: Salem, the capital, 4,258; Portland, the largest city, 90,426; Astoria, 8,381; Baker City, 6,663, and Oregon City, 3,494.

Orel (Russian pron. ar-yol'), a central government of Russia, s. of the Tula and Kaluga; area 18,042 sq. mi. Its surface, though flat, is elevated, and the soil raises grain and hemp in abundance, and some good hops and tobacco. Live-stock, particularly horses, are extensively reared from improved breeds. Manufactures are chiefly confined to the distillation of spirits. The principal rivers are the Oka, the Desna, and the Sosna. Orel, or Orlov, the capital, on the Oka, is an important business center, the rivers and canals giving it water communication with the Black Sea, the Caspian, and the Baltic. Its trade in grain, dairy produce, and cattle with Moscow and St. Petersburg is very extensive. Manufactures are also increasing, and the town is making rapid progress. Pop. 78,091. Pop. of government 1,963,706.

Ores'tes, in Greek mythology, the son of Agamemnon and of Clytemnestra, the avenger of his father, by becoming the murderer of his mother. For this murder he is relentlessly pursued by the Eumenides or Furies, and only succeeds in appeasing these terrible goddesses by carrying out the instructions of the Delphian oracle to bring back the statue of Diana from Tauris to Argos. Married to Hermione, daughter of Menelaus, Orestes ruled over his paternal kingdom of Mycenæ, and over Argos, upon the death of its king. Orestes is an important figure in the *Choëophori* and the *Eumenides* of Æschylus, the *Electra* of Sophocles, and the *Orestes* and *Iphigenia in Tauris* of Euripides.

Orfi'la, Matthew Joseph Bonaventura (1787–1853), a Parisian physician and chemist, b. at Mahon in the island of Minorca; d. at Paris. After taking his degree of M. D. in Paris, he delivered lectures on botany, chemistry, and anatomy, which, along with his medical practice, soon gave him a high reputation and a prominent position. Having been naturalized in France in 1818, he was next year appointed professor of medicine and toxicology at Paris, and in 1823 became professor of medical chemistry and medical jurisprudence. He wrote several important works on toxicology and medical jurisprudence; his *Leçons de Médecine Légale* and his *Traité de Toxicologie,* were translated into most of the languages of Europe.

Organ (Greek *orgănon;* an instrument), a wind instrument of music, the grandest of musical instruments, the introduction of which into the church service has undoubtedly exercised a powerful influence on the development of musical art. It is stated to be of very ancient origin, but is most probably the offspring

of the *hydraulicon* or *water organ* of the Greeks. The early organs were very imperfect instruments, but improvements were naturally made, from time to time, the most notable being those of the sixteenth century, when the bellows were much improved and the division of all the pipes into different stops invented, and the tone of the instrument adapted to the choir. The invention of the *wind chest* in the seventeenth century, by which an equal pressure of wind can be obtained from all the bellows, led chiefly to the present perfect state of the organ. The three essentials of an organ are: 1, a chest of compressed air; 2, a set of pipes producing musical sounds in communication with this chest; 3, a keyboard or clavier, by means of which this communication may be opened or closed at pleasure. The air is forced into the wind chest by means of bellows. To the upper part of each wind chest is attached a *sound-board*, a contrivance for conveying the wind to any particular pipe or pipes at pleasure, and divided into as many grooves as there are keys. Air is admitted into these grooves by means of valves or pallets, which are connected with the keys; the transmission of air being regulated by the *register* or *slide*. The series of pipes above each slide is called a stop. The principal stops of an organ are the *open*, *stopped*, and *double* diapasons; the *principal*, *dulciana*, *twelfth*, *fifteenth*, *flute*, *trumpet*, *clarion*, *bassoon*, *cremona*, *oboe*, and *vox humana*. An organ may have several wind chests filled by the same bellows, and several keyboards, each keyboard and wind chest representing a distinct organ. In the largest instruments the number of these organs generally amounts to five, viz., the *great organ*, the *choir organ*, the *swell organ*, the *solo organ*, and the *pedal organ*. The keyboards for the hand are termed *manuals*, that for the feet the *pedal*. The most usual compass of the manuals is from CC to F in alt, four octaves and a half; that of the pedal from CCC to E or F, two and a quarter to two and a half octaves. There are two kinds of organ pipes—*flute* pipes or *mouth* pipes, and *reed* pipes, of each of which there are several species, the character and quality of their sound depending mainly on the material employed in their manufacture (wood or metal), their shape and dimensions. A hydraulic engine has been adapted, with success, to the purposes of working the bellows, and it is now pretty generally adopted. In 1863 a contrivance was patented for transferring some of the work from mechanism to electro-mechanism. An organ built on this principle is termed an *electric organ*. The principal advantages of this description of organ are that it facilitates the playing, and enables the organist to sit at a keyboard at a distance from the instrument. Among the largest organs are those in St. Peter's in Rome, of the Seville Cathedral, of Weingarten in Suabia, of Haarlem, and of Notre Dame, Paris. A free-reed instrument was introduced about 1860 by Mason & Hamlin of New York, known as the *American organ*, differing from the harmonium in having smaller and more curved reeds and drawing the air inward. It is more easily blown than the harmonium, and its tones are of a more organ-like quality, but it is inferior to the latter instrument in variety of tone and power of expression.

Organ, in biology, any part of a plant or animal performing a particular function, essential to the life or growth of the individual. Living creatures differ from inanimate beings in the possession of these organs, and hence are said to be composed of *organic* matter, while the latter are called *inorganic*. Even the lowest forms of life display these organs. The most primitive organ is the *nucleus*, in such forms as the *amoeba*. A little higher in the scale appear *cilia*, and each advance through the whole scale of life is marked by an increase in the number, complexity, and specialization of these organs. Examples: lungs, eyes, heart, limbs, stomach, etc.

Orgies (Greek, *orgia*), anciently the mystic rites and wild revels celebrated in honor of Bacchus; also the festivals and mysteries of other pagan deities. See *Bacchus* and *Mysteries*.

Ori'flamme, until Charles VII's reign, the royal standard of France, originally the banner of the abbey of St. Denis and its lord protector. When the French kings chose St. Denis as their patron saint, they made the oriflamme the principal banner of their armies. It was a piece of red taffeta fixed on a golden spear, in the form of a banner, and cut into three points, each of which was adorned with a tassel of green silk.

Origen (or'i-jen) (Origines) (185–254 A. D.), surnamed *Adamentios*, one of the greatest and most influential of the Greek fathers, b. at Alexandria, d. at Tyre. His father suffered martyrdom at Alexandria in 202 under the Emperor Severus, when Origen undertook the support of his mother and six children. He lectured with much success in Alexandria, and gained the patronage of Bishop Demetrius. His own studies were pursued with extraordinary zeal; he lived an ascetic life, and in order to be free from the lusts of the flesh he mutilated himself. A journey to Rome (211–212) greatly increased his reputation, and Christian communities in various countries vied with each other in securing his services. In 228 he went to Palestine; he was so well received, and so many favors were bestowed on him, that his patron became jealous, recalled him to Alexandria, and finally deprived him of his priestly office, charged him with heresy, and expelled him from the city. These persecutions never ceased until the death of Demetrius in 231. In a new persecution, under the Emperor Decius, Origen, who was viewed as a pillar of the church, was thrown into prison, and subjected to the most cruel sufferings, ultimately resulting in his death. He has been reproached with having attempted to blend the Christian doctrines with the notions of Plato, and, without reason, of favoring materialism. He is credited with some 6,000 works, including smaller tracts, but only a few have been transmitted to us, and some of these

only in a distorted form. His work against Celsus is considered as the most complete and convincing defense of Christianity of which antiquity can boast. One of his works was the *Hexapla* (which see), but of it we have only fragments. A translation of his extant works into English has been published.

Original Package. In interstate commerce this signifies the package or covering in which goods are shipped. The term has acquired special significance, through a series of decisions of the U. S. Supreme Court, regarding the power of a state to legislate regarding the sale of articles of interstate commerce, and especially concerning liquors, tobacco, etc. While a state can regulate commerce within itself, the U. S. constitution delegates to congress the power to regulate commerce between states. Hence a "Prohibition" state can prohibit the sale or manufacture of liquors in the state, but according to the U. S. Supreme Court, imported liquors cannot be regulated by the state, until they become a part of the general mass of its property. And furthermore, goods remaining in the original packages in which they are shipped, and while in the hands of the importers, are not part of the general property of the receiving state and hence are not within its jurisdiction. According to these decisions, it was easy to sell liquors directly to the consumers, in the original packages, and thus avoid state laws. This possibility was extended by exceedingly liberal interpretation of the term "original package." In 1890 a law was passed by which all liquors become subject to the police powers of a state as soon as they arrive within its boundaries. This limited greatly the application of the "original package" decisions, and simplified the enforcement of liquor laws.

Origin of Species. See *Species.*

Orillia, Simcoe co., Ontario, on Lake Couchiching, 86 mi. n. of Toronto. Railroads: junction of Northern and Midland divisions of Grand Trunk. Industries: carriage works, two flouring mills, two iron foundries, two woolen mills, veneer works, sash and door factories. Surrounding country agricultural. The town was first settled in 1832, and surveyed into town lots in 1841, became a town in 1876. In 1608 the place was a great Indian center and was known as Cahaigue. Pop. est. 1897, 6,000.

Orinoco, a river of South America, one of the largest in the world, rising in the Sierra del Parima, near lat. 3° 40′ n., lon. 64° w., and after a circuitous course falling into the Atlantic opposite Trinidad; its principal mouth being 6 leagues wide; length about 1,500 mi. The Orinoco is connected with the Rio Negro, a tributary of the Amazon, by the Cassiquiari, a natural canal joining the two rivers, and it receives the waters of many large rivers. During the rainy season it inundates the immense plains through which it flows, presenting to the eye a boundless expanse of waters. The scenery on its banks is magnificent beyond description. Two remarkable rapids occur in the upper part of the Orinoco, and from these the river is navigable to its mouth (about 780 mi.).

Oriole, a name popularly applied to two groups of birds, the one group included in the Conirostral section of the Insessores or perching birds, the other classified with the Dentirostral section. The American orioles belonging to the former group are nearly allied to the starlings. The Baltimore bird (which see), oriole, or golden robin, is a familiar species of this group. Another, the orchard oriole, is distributed very generally over the U. S. The

Golden Oriole.

orioles proper, or those of the Old World, are nearly related to the thrushes. They are found in Asia, Africa, the islands of the Indian Archipelago, and Southern and Eastern Europe. The golden oriole is the typical form, and the only European member of the group. The wings and tail of the males are black, and contrast powerfully with the golden color of the body. In size it resembles a common thrush or blackbird. It chiefly inhabits Southern Europe. The song is loud and resembles the song of the flute.

Ori'on, a hero of Greek mythology. According to Homer he was a beautiful youth, of whose charms Eōs (Aurora) became enamored. The gods were jealous of her love, and Artemis slew him with her arrows. According to other writers he was a great hunter of colossal stature, and died of the sting of a scorpion. The hero after his death was placed with his hounds in the heavens as a constellation, which bears his name.

Ori'on, a constellation situated in the southern hemisphere with respect to the ecliptic, but the equinoctial passes nearly across its middle. This constellation is represented by the figure of a man with a sword by his side. It contains seven stars, which are very conspicuous to the naked eye; four of these form a square, and the three others are situated in the middle of it in a straight line, forming what is called the *Belt of Orion*, and popularly the *Ell-wand* or *Yard-wand.*

Oris'sa, a maritime province of Hindustan, lying on the Bay of Bengal, between Bardwan and the Madras Presidency, forming a division or commissionership under the jurisdiction of

the lieutenant governor of Bengal. It has an area of 9,053 sq. mi., and includes the three districts of Balasore, Cattack, and Puri, and a number of tributary states. The surface along the shore is in general low and sandy and in the interior wild and rugged. The inhabitants are composed chiefly of Oorias, the conquerors of the country; and of wild hill tribes. The largest river is the Mahánadi. The chief towns are Cattack, Puri or Juggernauth, and Balasore. Pop. 3,380,735.

Oriza'ba, a town of Mexico, state Vera Cruz, 65 mi. w.s.w of Vera Cruz, and on line of railway connecting the latter city with Mexico. It lies in a fertile valley, 3,975 ft. above sea level, and is a rapidly improving trade center. Tobacco, grown in the neighborhood, is extensively manufactured, also leather and woolen cloths. In its vicinity is the extinct volcano, the Pico de Orizaba 17,665 ft. high. Pop. about 20,000.

Orkney Islands (the ancient *Orcădes*), a group lying off the northern coast of Scotland, and separated from it by a channel called the Pentland Firth about 6 to 8 mi. broad; aggregate area 375 sq. mi. There are 67 islands and islets, 28 of which are inhabited. Pomona or Mainland is the largest of the group; others of considerable size are, Hoy, South and North Ronaldshay, Westray, and Shapinshay. Excepting Hoy, none of the islands have hills of any height; there are no large streams, but many lakes and springs. The climate is moist but not cold, being remarkably mild in winter. Agriculture, pasturing, and fishing are the supports of the inhabitants, manufactures being restricted to hosiery, chiefly hand-made by women. The fisheries are vigorously prosecuted. Agriculture is not in a flourishing condition, and the crofters of the islands were included in the Crofter's act of 1886. The chief town is Kirkwall. It is probable that the Picts originally possessed the islands, but in the eighth century and subsequently they were occupied by the Northmen. In the ninth century Harold Haarfager attached them to Norway, and for several centuries they were ruled by jarls or earls, who sometimes owned allegiance to Norway, sometimes to Scotland. About the middle of the thirteenth century they were transferred to Alexander, king of Scotland; but the Norwegians continued to assert their sovereignty. James III of Scotland received the islands as a dowry with Margaret of Norway in 1469, and ever since they have belonged to Scotland. Pop. 30,438.

Orléans (or-lā-äṇ), a city of France, formerly capital of Orléanais, now of the department of the Loiret, situated on the right bank of the Loire, 68 mi. s.w. of Paris. It has some handsome public squares, a Gothic cathedral, two hôtels-de-ville, a palais de justice, and other notable buildings. The manufactures and trade of the place have much declined; confectionery, pottery, and woolen goods are the staple articles of manufacture. Philip of Valois erected Orléans into a duchy and peerage in favor of his son, and Orléans has since continued to give the title of duke to a prince of the blood-royal. In 1428 the city sustained a siege against the English, and was relieved by the Maid of Orléans (see *Joan of Arc*), whose statue in bronze stands in one of the public squares. It was taken and retaken more than once in the Franco-German War in the latter part of 1870. Pop. 51,208.

Orléans, a French royal family, two houses of which have occupied the throne of France, 1, On the death of Charles VIII without issue in 1498, Louis, duke of Orléans, great grandson of their common ancestor Charles V, and grandson of the first duke of Orleans, being the nearest heir, ascended the throne under the title of Louis XII. Henry III (d. 1589) was the last sovereign of this house, or the *Valois-Orléans* branch. 2, The house of *Bourbon-Orléans* is descended from Philip, duke of Orléans, son of Louis XIII and younger brother of Louis XIV. His son Philip, duke of Orléans, was regent of France during the minority of Louis XV. His grandson Louis-Philippe Joseph, who assumed the surname of *Egalité*, was beheaded in 1793. See article below. Louis Philippe, duke of Chartres, afterward king of the French, was the son of *Egalité*. The grandson of Louis-Philippe, the Comte de Paris, b. 1838, and educated in England, is now the head of the royal house and royalist party of France. See *Bourbon* and *Paris, Comte de.*

Orléans, Jean Baptiste Gaston, Duke of (1608–1660), third son of Henry IV of France, and Mary of Medici. His early education was miserable, and the cause of the feebleness of character which he displayed through life, although he had received from nature much more of his father's spirit than his brother Louis XIII. The latter was jealous of the duke, and opposed him in many ways, while the duke retaliated by intriguing against the king; and but for Richelieu, who was a greater power in the state than the royal family itself, might have succeeded. During the disturbances of the Fronde he joined De Retz, the soul of the Fronde, who, however, soon saw through the character of his fickle and feeble confederate. After the termination of the troubles (1648) the duke was banished to Blois.

Orléans, Louis Philippe Joseph, Duke of (*Égalité*), (1747–1793), great-grandson of the regent, Philippe, duke of Orléans, married in 1769 the daughter of the Duke of Penthièvre. His opposition to the court began in 1771, and he became the rallying point of its enemies. In 1787, he was exiled for the part he took in the Assembly of Notables; in 1789 he was one of the nobles who joined the Tiers Etat (Third Estate); in 1792 he went over to the revolutionary party, without reserve, took the name of *Philippe Égalité* ("Philip Equality"), and voted for the death of Louis XVI. It did not save him from being arrested as a Bourbon, condemned and beheaded.

Orléans, Maid of. See *Joan of Arc.*

Orléans, Philippe, Duke of (1640–1701), only brother of Louis XIV of France, and founder of the house of Bourbon-Orléans, which for a

short time held the throne of France. In his twenty-first year he married Henrietta of England, sister of Charles II. The great esteem which the king showed for this princess excited the jealousy of his brother, and her sudden death was attributed to poison, to the administration of which the duke was suspected of being accessory. The second marriage of the duke, with the Princess Elizabeth of the Palatinate (1671), was arranged by Louis to secure the neutrality of the Elector Palatine in the approaching war against Holland. In this war the duke distinguished himself in spite of his effeminacy.

Orléans, PHILIPPE DUKE OF, (1674–1723), Regent of France, son of Philippe, duke of Orleans (see preceding article), and the Princess Palatine Elizabeth. He fell early under the influence of the clever and unscrupulous Abbé (afterward Cardinal) Dubois, who continued his confidant and adviser through life. In 1692 he married Mdlle. de Blois, the legitimated daughter of Louis. In 1707 he was appointed to succeed the Duke of Berwick in Spain, and completed the subjugation of that country. He was recalled, however, being suspected of intriguing for the crown of Spain, and again forced into retirement. On the death of the king (Sept. 1, 1715) he was appointed regent. On acceding to power the regent found the finances in extreme disorder, and endeavored to improve matters by retrenchment and peace; but his reckless introduction of a vast paper currency brought the nation to the verge of bankruptcy. He resigned the government to Louis XV, on Feb. 13, 1723.

Orloff, a Russian noble family, of whom the following members may be mentioned: GREGORY ORLOFF (1734–1783), assisted the Grand Princess Catharine in the revolution, by which she was declared Empress (Catharine II), and her husband, the Emperor Peter III, deprived of life. Orloff soon attained the highest dignities and became enormously rich. ALEXIS, his brother (1737–1808), is famous for his devotion to the empress, as one of the murderers of Peter III, and as the admiral who defeated the Turkish fleet off Tschesme. ALEXIS FEDORVITCH (1787–1861), prince, a descendant of the same family. In 1825 he gained the favor of Nicholas I by assisting to suppress the revolt of the guards on his accession. He held a calvary command in the Turkish campaign of 1828, and assisted in suppressing the Polish insurrection in 1831; he also rendered successful diplomatic service, especially at Constantinople. In 1844 he was appointed chief of the gendarmes and secret police. He was the confidential friend of the emperor.

Ormuz (or Hormuz), an island in the Persian Gulf, on the north side, near its entrance, about 15 mi. in circumference. It is entirely destitute of vegetation, and is only noticeable as having once been a great trade center. It was held by the Portuguese from 1515 to 1622. A few ruins are all that is left of its former wealth and splendor.

Ormuzd (*Ahuramazda*, the Oromasdes of the Greeks and Romans), the name of the supreme deity of the ancient Persians. According to the doctrine of Zoroaster he was the lord of the universe and the creator of earthly and spiritual life, the source of light, wisdom, and intellect, and the giver of all good. He rewards the good and punishes the wicked. See *Zoroaster.*

Ornithology. See *Birds.*

Ornithorhynchus, the duck-billed water mole of Australia. With the porcupine ant-eater of Australia it forms the lowest division

Ornithorhynchus.

of the mammalian class. This curious animal was first described by Shaw in 1792, and caused no little excitement among zoologists. It presents a quadruped, of the shape and size of a small otter, covered with short brown fur; a horny flat bill like a duck; a short flat tail; short legs with five-toed and webbed feet, terminated by claws. The eyes are small; external ears wholly wanting. The skull is bird-like in conformation; brain without convolutions; coracoid bones as in birds well developed. Its young are produced from eggs, are born blind and hairless, and suckled from milk glands destitute of nipples. It forms large burrows in river and lake banks, rising from near the surface of the water to a height of perhaps 20 ft. above it, the nest being at the higher end. It swims for its food, which consists of insects, worms, larvæ, etc.

Ornithorhynchus asleep.

Oron'tes, a river of Syria, rising on the east of the Anti-Libanus, and entering the Mediterranean; entire course about 200 mi. It is not navigable.

Orota'va, a town and port of the Canary Islands, in the northwest of the island of Teneriffe. The town is about 3 mi. from the port, and is a favorite summer residence of the rich Canarians. The port has a considerable trade. Pop. 8,293.

Orphan Asylum (or Orphanage), an establishment in which orphans are provided for and educated. In all well-regulated states the duty of taking care of destitute orphans was recognized at an early age, and it appears that the cities of Thebes, Athens, and Rome had establishments in which orphaned, deserted,

and illegitimate children were supported and educated at the public expense. In the laws of Emperor Justinian there is frequent mention of such institutions. In the Middle Ages such asylums were numerous and generally under the direction of the clergy. In recent times public orphanages have been substituted or supplanted by the farming out system, that is, the children are brought up in private families willing to undertake their charge. This system, with due care in the selection of guardians and judicious supervision, has proved satisfactory wherever it has been tried. It is more economical, and the example of respectable family life cannot fail to have a beneficial moral influence. Orphan asylums, as conducted in the U. S., are supported as private institutions, assisted by legislative appropriation. They are fostered also by the religious denominations.

Orpheus (or'fūs), a personage of great importance in the mythology of Greece, surrounded by a multitude of legends, which invariably associate him with Apollo and the Muses. To him is attributed the application of music to the worship of the gods. Apollo presented him with his lyre, and the Muses instructed him to use it, so that he moved not the beasts only, but the woods and rocks with its melody. Having lost his wife Eurydice by the bite of a serpent he descended into Hades to try and get her back. His music so moved the infernal deities Pluto and Proserpine that they consented to her return to earth, only her husband, whom she was to follow, must not look back till they had reached the upper world. This condition the impatient Orpheus violated and lost his wife forever. He is said to have met his death at the hands of a band of furious women engaged in the mystic rites of Bacchus. He is represented as one of the Argonauts, and to him is ascribed the origin of the so-called Orphic mysteries connected with the worship of Bacchus. A considerable literature was connected with the name of Orpheus, the oldest portions of which were not earlier than 530 B.C. In part it yet exists, there being still extant a nythological poem called *Argonautica*, certain hymns, etc.

Orrery, Charles Boyle, Earl of (1676–1731). He was educated at Oxford, and succeeded his brother in the earldom (an Irish title) in 1708. For his services in connection with the Treaty of Utrecht he was created a British peer, as Lord Boyle. He published an edition of *Phalaris*, which gave rise to the controversy with Doctor Bentley.

Orris Root (or Iris Root), the root of several species of *Iris*, especially of the *I. florentina*, which on account of its violet-like smell is employed in perfumery, and in the manufacture of tooth powder. It is also used in pharmacy as a pectoral.

Orsi'ni, one of the most illustrious and powerful families of Italy. It became known about the eleventh century, and had already acquired high rank and extensive possessions in the Papal States when one of its members, Giovanni Gaetano, was raised to the pontificate under the title of Nicholas III (1277–80). The feud between the Orsini and Colonna families is celebrated in history; it commenced toward the close of the thirteenth century, and is distinguished for bitterness, unscrupulousness, and violence, assassination being not infrequently resorted to. Many of the Orsini became famous military chiefs. Vincenzo Marco Orsini (Benedict XIII) succeeded Innocent XIII as pope in 1724. The Orsini family is now divided into two branches, the Orsini-Gravina at Rome and the Orsini of Piedmont.

Orsini, Felice (1819–1858), an Italian revolutionist. In 1838 he was sent to study law at the University of Bologna, and joined the Society of Young Italy, formed in 1831 by Mazzini. In 1843 he took an active part in an insurrection, and being apprehended along with his father, also an ardent patriot, was sentenced to the galleys for life. By the amnesty of July 16, 1846, he obtained his freedom, but soon after he again engaged in intrigues under Mazzini, and took prominent part in the stirring events of the following years. In 1855 he was condemned to death, but the sentence was not carried out, and in 1856 he escaped to London. Here he wrote his work, *Austrian Dungeons in Italy* (1856), and lived by giving lectures on his adventures. He now planned the assassination of Napoleon III as the main prop of reactionary tendencies in Europe, in concert with three Italian refugees, Rudio, Gomez, and Pieri. The attempt was made on Jan. 14, 1858, but was unsuccessful, and Pieri and Orsini were executed March 13, 1858, Gomez and Rudio being sentenced to imprisonment for life.

Orsted (or Oersted) (eur'sted), Hans Christian (1777–1851), Danish physicist. He studied at the University of Copenhagen, spent several years at the expense of the government in Holland, Germany, and Paris; was in 1806 appointed extraordinary professor of physics at Copenhagen; and in 1812–13, while on a second tour in Germany, he drew up his views of the chemical laws of nature, which he afterward published in Paris under the title of *Recherches sur l'Identié des Forces Electriques et Chimiques.* His fame first became diffused over the scientific world in 1819 by the discovery of the fundamental principles of electro-magnetism. In 1829 he became director of the Polytechnic School of Copenhagen, and on the occasion of his jubilee festival in 1850 he was created a privy-councillor.

Or'thite, a silicate of aluminum containing the rare metals cerium, lanthanum, didymium, and yttrium, occurring in granite and other rocks in Sweden, Greenland, the Ural, etc.

Or'thodox (Greek, *orthos*, right, and *doxa*, opinion), the opposite of *heterodox*, generally applied to what is regarded as the established opinion, or to that which is commonly considered as right. The term is chiefly used in religious controversies to designate certain religious faiths or doctrines.

Orthopæ'dia (Greek, *orthos*, straight, *paideia*, training), a branch of medical science relating to the cure of natural deformities. Hippocra-

tes already occupied himself with the correction of deformed bones, but it was not until a comparatively recent epoch that this important subject met with the serious attention it deserved. Several institutions for the cure of bodily malformations were founded in France and Germany in the early part of this century. Orthopædia is divided into prophylactic or preventive, and therapeutic or curative. The object of the former is to prevent deformities in infants, and is obtained by hygienic means, such as pure air, careful nursing, and suitable food, clothing, and exercise; that of the latter is to correct deformities already existing by mechanical treatment, which is most successful when resorted to as soon as any deviation from natural shape manifests itself. In our time the manufacture of orthopædic apparatus has become highly developed, and forms an important branch of trade.

Ortler Spitze (or Ortler), a mountain of the Alps, in Tyrol, near the borders of Switzerland and Italy, the highest of the Australian and German Alps; height 12,814 ft. The group to which this mountain belongs is known as the Ortler Alps.

Ortolan.

Or'tolan, a bird of the bunting family, a native of Northern Africa and Southern Europe. The colors are yellow on the throat and around the eyes, the breast and belly being of reddish hue, while the upper part of the body is brown varied with black. Its delicate flesh is much esteemed by epicures, and large quantities are annually caught and fattened for the table in the south of France, Italy, and Cyprus.

Oru'ro, a town of Bolivia, capital of a department of the same name, on a bleak hill in a metalliferous district, at an absolute height of 13,000 ft. It has lost its former importance, and the population, once exceeding 40,000, is now below 12,000. The department has an area of 25,640 sq. mi. Pop. 170,000.

Oryx, the name of the genus of antelopes represented by the addax, and by other species, found in large herds chiefly in the northern portions of the African continent. The horns are very long, spiral, and curved backward. The gemsbok of South Africa is another species included in this genus.

Osage City, Osage co., Kan. Railroads: A. T. & S. F.; C. K. & W.; and Missouri Pacific. Industries: brick yard and many coal mines. Surrounding country agricultural and mineral. The town was first settled in 1866, and became a city in 1872. Population, 1900, 2,792.

Osage, a river which rises in Kansas, flows through Missouri, and after a winding course of 500 mi. joins the Missouri 10 mi. below Jefferson City. The river gave name to an Indian tribe, the remnant of which now inhabits the Indian Territory.

Osage Orange, a tree indigenous to North America, where it is frequently used as a hedge plant. It produces a large yellow fruit of woody texture, somewhat resembling an orange, but not edible.

Osa'ka (or Ohosa'ka), the second city and a free port of Japan, in the island of Hondo, on the estuary of the Yodo Gawa, 28 mi. s.s.w. of Kioto. It is intersected by canals, which are spanned by numerous wooden bridges. The banks of the main channel are lined for 2 or 3 mi. with the residences of the nobles, and it has a strong citadel. A railway connects it with Yeddo. The greater part of its foreign trade is carried on at Hiogo. Pop. 473,541.

Oscarl, Joseph François Bernadotte (1799–1859), king of Sweden and Norway, son of Bernadotte (Charles XIV), b. at Paris. In 1823 he married Joséphine, eldest daughter of Prince Eugène Beauharnais. During the reign of his father he was three times (in 1824, 1828, and 1833) viceroy of Norway, where he made himself popular by his good administration. He acceded to the throne in 1844; reformed the civil and military administration of the state; abolished primogeniture; established complete liberty of conscience; encouraged education and agriculture; promoted railways, telegraphs, etc. He took little part in foreign politics. He resigned in favor of his eldest son in 1857.

Oscar II, king of Sweden and Norway, b. 1829; succeeded his brother, Charles XV, in 1872. He is a writer of some merit; has translated Goethe's *Faust* into Swedish, and published a volume of poems under the pen-name of Oscar Frederik. Pl. 31, Vol. IV.

Oshawa, Ontario co., province of Ontario, on Lake Ontario 33 mi. e. of Toronto. Railroads: Grand Trunk and Oshawa electric. Industries: carriage works, flouring mills, iron foundry, woolen mill, tannery, brass foundry, planing mill, metal roofing co., etc. Surrounding country agricultural and stock raising. The town was first settled about 1820. Pop. 4,200.

Oshkosh, Winnebago co., Wis., on Lake Winnebago and Fox river, 160 m. n. of Chicago. Railroads: C. & N. W., C. M. & St. P., and Wisconsin Central. The principal industries are lumber companies, flouring mills, iron foundries and sash and door factories. The town was settled in 1836, and became a city in 1853. Oshkosh was named for a famous Menominee chief. It is the seat of a state normal school. Pop. 1900, 28,284.

Osi'ris, one of the great Egyptian divinities. He was the brother and husband of Isis, and the father of Horus. He is styled the manifestor of good, lord of lords, king of the gods, etc. In the Egyptian theogony he represented the sum of beneficent agencies, as Set of evil agencies. Osiris, after having established good

laws and institutions throughout Egypt fell a prey to the intrigues of his brother Set the Typhon of the Greeks. He became afterward the judge of the dead. There are a multitude of traditions, both Greek and Egyptian, about Osiris. He is represented under many different forms, and compared sometimes to the sun and sometimes to the Nile. His soul was supposed to animate the sacred bull Apis, and thus to be continually present among men. His worship extended over Asia Minor, Greece, and Rome; the rise of Christianity put an end to it.

Oskaloosa, Mahaska co., Iowa, 52 mi. s. e. of Des Moines. Surrounding country agricultural, underlaid with coal. Railroads: C. R. I. & P.; Iowa Central; C. B. & Q. Industries: brick paving co., four flouring mills, three iron foundries, factories, etc. The town was first settled in 1844 and became a city in 1853. Pop. 1900, 9,212.

Osman Digma, a Soudanese slave merchant and lieutenant to the Mahdi, b. at Suakin about 1830, of Turkish descent on his father's side. He has proved himself one of the ablest leaders on the Mahdist side, having defeated an Egyptian force under Baker Pasha in 1884 near the Red Sea coast of the Soudan. He was defeated soon after by a British force, and again in 1885, but not without causing severe losses.

Osmanieh, a Turkish order established by Abdul Aziz in 1861 for the reward of services rendered to the state. The chief decoration is a golden six-pointed star enameled in green.

Osman Pasha, Turkish general, b. at Tokat in Asiatic Turkey 1832; entered the Turkish army in 1853; fought with distinction in the Crimean War, the Syrian rebellion, and the Crete Campaign, but his great achievement was the defense of Plevna during the Russo-Turkish War (1877). He afterward held the office of war minister and several other high posts. Died in Constantinople, April 4, 1900.

Osmium, one of the platinum metals, forming a bluish-white lustrous mass, having a specific gravity of 22.48, being thus the heaviest of all bodies. It may also be obtained in crystals, or as a black amorphous powder, which is very combustible. Osmium is the most infusible of all the metals. It combines with chlorine in different proportions, also with sulphur, and forms alloys with some other metals. Osmic acid acts as a powerful oxidizer, decarbonizing indigo, separating iodine from potassium iodide, converting alcohol into acetic acid, etc.

Osmosis (Os'mose), the tendency of fluids to pass through porous partitions and mix or become diffused through each other. It includes *endosmose*, or the tendency of a fluid to pass inward into another through such a partition, and *exosmose*, or the tendency of a fluid outward. When two saline solutions, differing in strength and composition, are separated by a bladder, parchment paper, or porous earthenware, they mutually pass through and mix with each other; but they pass with unequal rapidities, so that, after a time the height of the liquid on each side is different. Of all vegetable substances sugar has the greatest power of endosmose, and of the animal substances albumen has the greatest. Graham showed that osmose was due to the chemical action of the fluids on the septum. In fact the corrosion of the septum seems necessary for the existence of osmose. See also *Diffusion.*

Osnabrück (or Osnaburg), an ancient town of Prussia, in Hanover, on the Hase, and 71 mi. w. of Hanover. In the old town it possesses many interesting buildings in Gothic and Renaissance style. It was formerly an important seat of linen manufacture; and gave a name to the kind of coarse linen known as osnaburg. Its chief manufactures are now chemicals, iron and steel, paper, cotton, and tobacco. Pop. 35,899.

Osprey, a well-known raptorial bird, called also *fishing hawk*, *fishing eagle*, and *sea eagle.* It occurs both in the Old and the New World, near

Osprey.

the shores of the sea, or great rivers and lakes, and builds its nest in high trees and cliffs. It lives on fish, and pounces with great rapidity on its prey, as it happens to come near the surface of the water, the toes being armed with strong curved nails. The general body-color is a rich brown, the tail being banded with light and dark (in the old birds the tail is pure white), head and neck whitish on their upper portions, and a brown stripe extends from the bill down each side of the neck; under parts of the body whitish, legs of a bluish tint. In length the osprey averages about 2 ft., the wings measuring over 4 ft. from tip to tip. The female lays three or four eggs. The American bald eagle pursues the osprey, who drops his prey with the view of escaping, when the eagle immediately pounces after the descending fish, and seizes it ere it touches the water.

Ossa, a mountain of Northern Greece, in Thessaly, separated by the vale of Tempe from Mount Olympus; height 6,348 ft.

Ossoli, Margaret Sarah Fuller (1810–1850), an American authoress, remarkable for her precocious and extensive linguistic attainments. She became associated with Em-

1. American Ostrich (Rhea americana).

2. Australian Ostrich (Emu).

3. Australian Ostrich (Cassowary).

4. Kiwi (Apteryx australis).

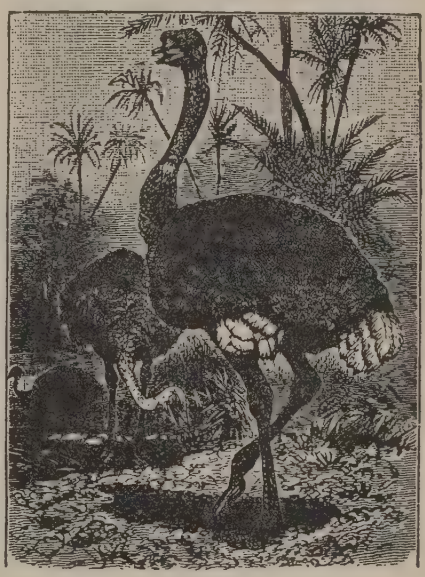
erson and other eminent literary men. In 1840 she started and edited the *Dial* (a social and philosophical magazine), and in 1844 became a writer to the New York *Tribune*. She visited Europe in 1846, married in 1847 the Marchese Ossoli; was in Rome during the siege of 1849, when she acted as superintendent of a hospital for the wounded, and embarked with her husband for New York, but they were wrecked, and both perished off Long Island, July 16, 1850. She wrote several works (besides translations), including *Women in the Nineteenth Century*, *Summer on the Lakes*, etc. A new edition of her works was published in Boston (1874).

Ostend', a seaport of Belgium, province of West Flanders, on the North Sea, 67 mi. n.w. of Brussels. The cod and herring fishing, and the cultivation of oysters, are considerable industries, and the export of butter, eggs, poultry, and rabbits is extensive. Owing to its extensive firm and smooth sands it is a favorite sea-bathing resort, especially for continental visitors. It dates from the ninth century. It sustained a memorable siege by the Spaniards from July 4, 1601, to Sept. 28, 1604, when it capitulated. Pop. 25,203.

Os'tia, an ancient city of Italy, at the mouth of the Tiber, 6 mi. from Rome by the Via Ostiensis. It was of great importance as the port of Rome and as a naval station, and for a long period it engrossed the whole trade of Rome by sea. The port, however, was never good, and owing to the gradual accumulation of the mud and other deposits brought down by the river, it ultimately became inaccessible to ships of large tonnage. Many efforts were made by various Roman emperors to improve the port, but without much success. It was destroyed by the Saracens in the ninth century. Its ruins comprise tombs, two temples, a theater, etc. The modern Ostia (founded by Gregory IV in 830) is a miserable village with but few inhabitants.

Os'tracism (Greek, *ostrakon*, a shell), a political measure practised among the ancient Athenians by which persons considered dangerous to the state were banished by public vote for a term of years (generally ten), with leave to return to the enjoyment of their estates at the end of the period. It takes this name from the shell or tablet on which each person recorded his vote. Among the distinguished persons ostracized were Themistocles, Aristides, and Cimon, son of Miltiades, who were afterward recalled.

Ostrich, a cursorial bird, of the family Struthionidæ, of which it is the type. It inhabits the sandy plains of Africa and Arabia, and is the largest bird existing, attaining a height of from 6 to 8 ft. The head and neck are nearly naked; the general body plumage is black, the wing and tail feathers white, occasionally with black markings, the quill-feathers of the wings and tail have their barbs wholly disconnected, hence their graceful appearance. The legs are extremely strong, the thighs naked. There are only two toes, the hind toe being wanting. The pubic bones are united, a conformation occurring in no other bird. The wings are of small size and are incapable of being used as organs of flight, but the birds can run with extraordinary speed, outdistancing the fleetest horse. The bill is broad and of a triangular depressed shape. The food consists of grass, grain, etc., and substances of a vegetable nature, and to aid in the tritura-



Ostrich.

tion of this food the ostrich swallows large stones, bits of iron and glass, or other hard materials that come in the way. Ostriches are polygamous, each male consorting with several females, and they generally keep together in flocks. The eggs average 3 lbs. in weight, and several hens often lay from ten to twelve each in the same nest, which is merely a hole scraped in the sand. The eggs appear to be hatched mainly by the exertions of both parents relieving each other in the task of incubation, but also partly by the heat of the sun. The South African ostrich is often considered as a distinct species under the name of *S. australis*. Three South American birds of the same family but of the genus *Rhea*, are popularly known as the American ostrich, and are very closely allied to the true ostrich, differing chiefly in having the head feathered and three-toed feet, each toe armed with a claw. The ostrich has been hunted from the earliest ages for its feathers, which have always been valued as a dress decoration. The feathers of the back are those most valued, the wing and tail feathers rank next. The black plumes are obtained by dyeing. The finest white feathers are exported from Aleppo, Egypt, Tunis, and Algiers, and the bulk of these find their way to Paris. The market value of the feathers naturally varies with their quality, the prevailing fashion, and the supply. At present prime white feathers bring from $100 to $250 per lb.

Oswald, king of Northumbria (634–642). He ruled over an extensive territory, including Angles, Britons, Picts, and Scots. He labored to establish Christianity on a firm footing, being in this assisted by St. Aidan. He died in battle against Penda of Mercia, and was reverenced as a saint.

Oswego, Oswego co., N. Y., at the mouth of Oswego River. Railroads: N. Y. O. & W.; D. L. & W.; and N. Y. C. & H. R. Industries: starch factory, flour mill, iron works, woolen mill, boiler company, oil box and match factories. Surrounding country agricultural. The town was first settled in 1615 and became a city in 1848. Pop. 1900, 22,199.

Osyman'dyas, an ancient king of Egypt, mentioned by Diodorus Siculus, who reports that he invaded Asia with a vast army, and penetrated as far as Bactria, and that on his return he erected at Thebes a monument to himself of unparalleled magnificence, with a sitting colossal statue of enormous size. The Memnonium at Thebes has been represented as his monument.

Ota'go, one of the provincial districts of New Zealand; area 15,000,000 acres. The interior is mountainous; many peaks attain the height of from 3,000 to 9,000 ft., but there is much pastoral land; the northeast consists of extensive plains. Otago, although it possesses valuable gold fields, is chiefly a pastoral and agricultural district, second only to Canterbury in wheat production. The largest river is the Clutha or Clyde, the largest of New Zealand. Coal has been found in abundance. Otago was founded in 1848 by the Scotch Free Church Association; it is now the most populous division of the colony. The capital is Dunedin; the next town in importance is Oamaru. Pop. 1,153,097.

Otho I, the *Great* (912–973), emperor of Germany, son of Henry I. He was crowned king of Germany at Aix-la-Chapelle in 936. After a fourteen years' struggle he subdued Boleslas, duke of Bohemia; he wrested the duchies of Suabia, Bavaria, and Lorraine from the dukes of Bavaria and Franconia, and gave them (in 949) to his sons Ludolf and Henry, and to his son-in-law Conrad, count of Worms, respectively. Otho was crowned King of Lombardy in 951 and was consecrated Emperor at Rome in 962 by Pope John XII after his expulsion of Berengarius, who had seized upon the territory bestowed upon the Pope by Pepin and Charlemagne. Otho reconfirmed its possession to the Holy See. The Pope having violated a pledge made to Otho caused the latter again to invade Rome, from which John XII suddenly fled to the antipope, Clement VIII. The Byzantine court refused to acknowledge Otho's claim to the imperial dignity; but he defeated the Greek forces in Lower Italy, and the Eastern emperor, John Zimisces, gave the Greek princess Theophania to his son Otho in marriage. The latter became Otho II.

Otho II (955–983), youngest son of Otho I, d. at Rome. His elder brothers had all died before their father, who caused him to be crowned king of Rome—the first instance of the kind in German history. In Italy he suppressed a rising under Crescentius, and then attempted to drive the Greeks from Lower Italy; but they called in the aid of the Saracens from Sicily (981), and Otho suffered a total defeat (982). He escaped by leaping into the sea, was picked up by a Greek ship, from which he afterward escaped by a ruse, and d. soon after at Rome.

Otho III (980–1002), son of the preceding, and the last of the male branch of the Saxon imperial house. He was only three years old when he succeeded his father. At the age of fifteen he marched into Italy and crushed a fresh insurrection fomented by Crescentius. He was consecrated emperor in 996 by Gregory V, a near relative of his own. He next suppressed a second rebellion under Crescentius, whom he caused to be beheaded. On the death of Gregory, Otho raised his old tutor, Gerbert, to the pontificate under the title Sylvester II. Peace in Rome was, however, only temporary, and until his death Otho was mostly employed in quelling disturbances in various parts of Italy.

Otho I (1815–1867), king of Greece, second son of Louis of Bavaria. In 1832 he was elected king of Greece; but his Germanic tendencies caused continual friction, which ended in a rebellion and his abdication (1862). He spent the latter part of his life in Munich.

Otho, Marcus Salvius (32–69 A.D.), Roman emperor. He joined Galba when he rebelled against Nero, and, on his accession in 67, Otho became his favorite and was made consul; but when Galba appointed Piso as his successor Otho bribed the army, had Galba and Piso murdered, and was proclaimed emperor in 69. He was acknowledged by the Eastern Provinces, but in Germany Vitellius was proclaimed by his legions. The latter having led his army into Italy, overthrew the forces of Otho at Bebriacum.

Ottawa, Franklin co., Kan., on Marias Des Cygnes River, 56 mi. s.w. of Kansas City. Railroads: Santa Fé; Southern Kansas; and Missouri Pacific. Industries: pipe factory, two flouring mills, iron foundry, railroad shops, furniture, shoe, cigar, and soap factories, and creamery. Surrounding country agricultural. Name derived from Ottawa tribe of Indians. The town was first settled in 1864 and became a city in 1867. First railroad train reached the city in 1868. Pop. 1900, 6,934.

Ot'tawa, a river in the Dominion of Canada, forming for a considerable part of its length the boundary between the provinces of Quebec and Ontario. It rises in the high land which separates the basin of Hudson's Bay from that of the St. Lawrence, and after a course of some 750 mi. discharges into the St. Lawrence above the island of Montreal. Six miles above the city of Ottawa rapids begin which terminate in the Chaudière Falls, where the river, here 200 ft. wide, takes a leap of 40 ft. Immense quantities of valuable timber are floated down the Ottawa from the wooded regions of the interior to Ottawa City, where it is manufactured into lumber.

Ottawa, Carleton co., Province of Ontario, on Ottawa and Rideau rivers, 120 mi. w. of Montreal. Railroads: Canadian Pacific; Canadian Atlantic; O. & P. S.; St. L. & O.; P. & P. J.; Gatineau Valley; O. & B.; and N. Y. & O. Industries: lumber mills, flouring mills, several iron foundries, car shops, carbon works, pulp and paper mills. Surrounding country agricultural and mining. The town was first settled in 1820 and called a town until 1848 when it became a city. In 1867 selected by the queen as capital of Canada to end disputes between the larger cities. Pop. 1901, 59,902.

Ottawa, La Salle co., Ill., on the Illinois River and the Illinois and Michigan Canal. Railroads: C. R. I. & P., and C. B. & Q. It is the center of a rich agricultural district and exports grain and other produce. In the vicinity are coal mines and mineral springs. Other industries include glass works, the manufacture of drain and roof tiles, cigars, lumber, pottery, flour, farming implements, etc. Pop. 1900, 10,588.

Otter, a carnivorous mammal, family of weasels. There are several species, differing chiefly in size and fur. They all have large flattish heads, short ears, webbed toes, crooked nails, and tails slightly flattened horizontally. The common river otter, inhabits the banks of

Otter.

rivers, feeds principally on fish, and is often very destructive, particularly to salmon. The under fur is short and woolly, the outer is composed of longer and coarser hairs of dark brown hue. They burrow near the water's edge, line their nest with grass and leaves, and produce from four to five young. The weight of a full-grown male is from 20 to 24 lbs.; length from nose to tail 2 ft., tail 15 to 16 in. The American or Canadian otter averages about 4 ft. in length inclusive of the tail. It is plentiful in Canada, and furnishes a valuable fur, which is a deep reddish brown in winter, and blackish in summer. The sea otters, represented typically by the great sea otter, inhabit the coasts of the North Pacific Ocean, but are of comparatively rare occurrence. The tail is short, measuring about 7 in. only; weight 60 to 70 lbs. The fur is soft, and of a deep lustrous black, or of a dark maroon color when dressed, and much prized. In general appearance the sea otter somewhat resembles a small seal.

Ottoman Empire, the Turkish Empire, the territories in Europe, Asia, and Africa more or less under the sway of the Turkish sultan. In Europe, besides the immediate provinces in the Balkan Peninsula, are Bulgaria (with Eastern Roumelia), and Bosnia, Herzegovina, etc., held by Austria; in Asia, Asia Minor, Syria, including Palestine, Mesopotamia, part of Arabia, Candia, and others of the islands of the Archipelago; in Africa, Egypt, over which there is a nominal suzerainty, and the vilayet of Tripoli. Formerly the empire was much more extensive, even in recent times comprising Greece, Roumania, Servia, Bessarabia, Tunis, etc. We shall here give a brief sketch of the history of the Ottoman Empire, referring to the article *Turkey* for information regarding the geography, constitution, etc., of Turkey proper.

The Ottoman Turks came originally from the region of the Altai Mountains, in Central Asia, and in the sixth century A.D. pushed onward to the west in connection with other Turkish tribes. Early in the eighth century they came in contact with the Saracens, from whom they took their religion, and of whom they were first the slaves and mercenaries, and finally the successors in the caliphate. In the thirteenth century they appeared as allies of the Seljukian Turks against the Mongols, and for their aid received a grant of lands from the Seljuk sultan of Iconium in Asia Minor. Their leader, Othman or Osman, of the race of Oghuzian Turkomans, became the most powerful emir of Western Asia, and after the death of the Seljuk sultan of Iconium in the year 1300 he proclaimed himself sultan. He died in 1326. Thus was founded upon the ruins of the Saracen, Seljuk, and Mongol power the empire of the Osman or Ottoman Turks in Asia; and after Osman, the courage, policy, and enterprise of eight great princes, whom the dignity of caliph placed in possession of the standard of the prophet, and who were animated by religious fanaticism and a passion for military glory, raised it to the rank of the first military power in both Europe and Asia (1300–1566).

The first of them was Orkhan, son of Osman. He subdued all Asia Minor to the Hellespont, took the title of *Padishah*, and became son-in-law to the Greek emperor Cantacuzenus. Orkhan's son, Soliman, first invaded Europe in 1355. He fortified Gallipoli and Sestos, and thereby held possession of the straits which separate the two continents. In 1360 Orkhan's second son and successor, Amurath I, took Adrianople, which became the seat of the empire in Europe, conquered Macedonia, Albania, and Servia, and defeated a great Slav confederation under the Bosnian king Stephen at Kossova in 1389. After him Bajazet, surnamed Ilderim (*Lightning*), invaded Thessaly, and also advanced toward Constantinople. In 1396 he defeated the Western Christians under Sigismund, king of Hungary, at Nicopolis, in Bulgaria; but at Angora in 1402 he was himself conquered and taken prisoner by Timour, who

divided the provinces between the sons of Bajazet. Finally, in 1413 the fourth son of Bajazet, Mohammed I, seated himself upon the undivided throne of Osman. In 1415 his victorious troops reached Salzburg and invaded Bavaria. He conquered the Venetians at Thessalonica in 1420; and his celebrated grand-vizier Ibrahim created a Turkish navy. Mohammed was succeeded by his son, Amurath II, who defeated Ladislaus, king of Hungary and Poland, at Varna in 1444. Mohammed II, the son of Amurath, completed the work of conquest (1451–81). He attacked Constantinople, which was taken May 29, 1453, and the Byzantine Empire came finally to an end. Since that time the city has been the seat of the Sublime Porte or Turkish government. Mohammed added Servia, Bosnia, Albania, and Greece to the Ottoman Empire, and threatened Italy, which, however, was freed from danger by his death at Otranto in 1480. His grandson, Selim I, who had dethroned and murdered his father in 1517, conquered Egypt and Syria. Under Soliman II, *the Magnificent*, who reigned between 1519 and 1566, the Ottoman Empire reached the highest pitch of power and splendor. In 1522 he took Rhodes from the Knights of St. John, and by the victory of Mohacz in 1526 subdued half of Hungary. He exacted a tribute from Moldavia, made Bagdad, Mesopotamia, and Georgia subject to him, and threatened to overrun Germany, but was checked before the walls of Vienna (1529). Soliman had as an opponent Charles V of Germany, as an ally Francis II of France. From his time the race of Osman degenerated and the power of the Porte declined.

In the latter part of the sixteenth century, and most of the seventeenth century, the chief wars were with Venice and with Austria. The battle of Lepanto (1571), in which the Ottoman fleet was overthrown by the combined fleets of Venice and Spain, was the first great Ottoman reverse at sea; and the battle of St. Gothard (1664), near Vienna, in which Montecuculi defeated the Vizier Kiuprili, the first great Ottoman reverse on land. In 1683 Vienna was besieged by the Turks, but was relieved by John Sobieski and Charles of Lorraine; in 1687 the Turks were again defeated at Mohacz, and in 1697 (by Prince Eugene) at Szenta. Then followed the Treaty of Carlowitz in 1699, by which Mustapha II agreed to renounce his claims upon Transylvania and a large part of Hungary, to give up the Morea to the Venetians, to restore Podolia and the Ukraine to Poland, and to leave Azov to the Russians. Eugene's subsequent victories at Peterwardein and Belgrade obliged the Porte to give up, by the Treaty of Passarowitz in 1718, Temeswar, Belgrade, with a part of Servia and Walachia; but the Turks on the other hand took the Morea from Venice, and by the Treaty of Belgrade in 1739 regained Belgrade, Servia, and Little Walachia, while for a time they also regained Azov.

Russia, which had been making steady advances under Peter the Great and subsequently, now became the great opponent of Turkey. In the middle of the eighteenth century the Ottoman Empire still embraced a large part of Southern Russia. The victories of Catharine II's general Romanzoff in the war between 1768 and 1774 determined the political superiority of Russia, and at the Peace of Kutchuk-Kainargi, in 1774, Abdul-Hamid was obliged to renounce his sovereignty over the Crimea, to yield to Russia the country between the Bog and the Dnieper, with Kinburn and Azov, and to open his seas to the Russian merchant ships. By the Peace of Jassy, 1792, which closed the war of 1787–91, Russia retained Taurida and the country between the Bog and the Dniester, together with Otchakov, and gained some accessions in the Caucasus. In the long series of wars which followed the French Revolution the Ottoman Empire first found herself opposed to France, in consequence of Bonaparte's campaign in Egypt, and finally to Russia, who demanded a more distinct recognition of her protectorate over the Christians, and to whom by the Peace of Bucharest, May 28, 1812, she ceded that part of Moldavia and Bessarabia which lies beyond the Pruth. In 1817 Mahmud II was obliged to give up the principal mouth of the Danube to Russia. Further disputes ended in the Porte making further concessions, which tended toward loosening the connection of Servia, Moldavia, and Walachia with Turkey. In 1821 broke out the war of Greek independence. The remonstrances of France, Britain, and Russia against the cruelties with which the war against the Greeks was carried on proving of no avail, those powers attacked and destroyed the fleet of Mahmud at Navarino (1827). In 1826 the massacre of the Janizaries took place at Constantinople, after a revolt. In 1828–29 the Russians crossed the Balkans and took Adrianople, the war being terminated by the Peace of Adrianople (1829). In that year Turkey had to recognize the independence of Greece. In 1831–33 Mehemet Ali, nominally pasha of Egypt, but real ruler both of that and Syria, levied war against his sovereign in 1833, and threatened Constantinople; when the Russians, who had been called on for their aid by the sultan, forced the invaders to desist. In 1840 Mehemet Ali again rose against his sovereign; but through the active intervention of Austria, Great Britain, and Russia. was compelled to evacuate Syria, though he was, in recompense, recognized as hereditary viceroy of Eygpt.

The next important event in the history of the Ottoman Empire was the war with Russia in which Turkey became involved in 1853, and in which she was joined by England and France in the following year. This war, known as the Crimean War (which see), terminated with the defeat of Russia, and the conclusion of a treaty at Paris on March 30, 1856, by which the influence of Russia in Turkey was greatly reduced. The principal articles were the abolition of the Russian protectorate over the Danubian principalities (Moldavia and Walachia, united in 1861 as the principality of Roumania), the rectification of the frontier between Russia

and Turkey, and the cession of part of Bessarabia to the latter power.

In 1875 the people of Herzegovina, unable to endure any longer the misgovernment of the Turks, broke into rebellion. A year later the Servians and Montenegrins likewise took up arms, and though the former were unsuccessful and obliged to abandon the war, the Montenegrins still held out. Meantime the great powers of Europe were pressing reforms on Turkey, and at the end of 1876 a conference met at Constantinople with the view of making a fresh settlement of the relations between her and her Christian provinces. All the recommendations of the conference were, however, rejected by Turkey; and in April following, Russia, who had been coming more and more prominently forward as the champion of the oppressed provinces and had for months been massing troops on both the Asiatic and the European frontier of Turkey, issued a warlike manifesto and commenced hostile operations in both parts of the Turkish Empire. She was immediately joined by Roumania, who on May 22 (1877) declared her independence. The progress of the Russians was at first rapid; but the Turks offered an obstinate resistance. After the fall of Kars, however, November 18, and the fall of Plevna, December 10, the Turkish resistance completely collapsed, and on March 3, 1878, Turkey was compelled to agree to the treaty of San Stefano, in which she accepted the terms of Russia. The provisions of this treaty were, however, considerably modified by the Treaty of Berlin concluded on July 13 following by which Roumania, Servia, and Montenegro were declared independent; Roumanian Bessarabia was ceded to Russia; Austria was empowered to occupy Bosnia and Herzegovina; and Bulgaria was erected into a principality. See *Berlin, Treaty of.* The main events in the history of the Ottoman Empire from the Treaty of Berlin to the year 1890 were the French invasion of Tunis in 1881, which soon after was formally placed under the protectorate of the French; the treaty with Greece, executed under pressure of the great powers in 1881, by which Turkey ceded to Greece almost the whole of Thessaly and a strip of Epirus; the occupation of Egypt by Great Britain in 1882; the revolution at Philippopolis in 1885, when the government of Eastern Roumelia was overthrown, and the union of that province with Bulgaria proclaimed; the results of the revolution were recognized by an imperial firman in 1886, and Eastern Roumelia has since for all practical purposes formed part of Bulgaria. On Sept. 3, 1891, there was a change of grand viziers, which occasioned much excitement, as it was believed that a plot had been hatched for replacing the deposed Sultan, Murad, on the throne. The new grand vizier was Djevad Pasha, governor of Crete. It was also indicated by this change that the authorities were anxious to depart from the established policy of Kiamil Pasha, as exhibited in regard to the passage of the Dardanelles by Russian transport ships. The British protested against this and their naval force made a demonstration at Sigri, for which an explanation was demanded. In June, 1895, Djevad Pasha was succeeded by Said Pasha, and he in turn was replaced by Kiamil Pashi in October. Kiamil Pasha being appointed Vali of Aleppo, was succeeded by Kahlil Rifaat Pasha. Constantinople was devastated by a great fire in July, 1890, the damage being estimated at $5,000,000. Miss Anna Milton, of the Board of Presbyterian Foreign Missions, was viciously attacked at Nastoria, a village of Duore, in June, 1892. Shortly after, the house of Dr. Bartlett, an American missionary at Burdur, in Asia Minor, was burned to the ground. A full compensation for this outrage was made by the Porte. In July, 1894, Constantinople was visited by a series of earthquakes which lasted eight days, two or more occurring each day. Great damage was done to the city and surrounding country, and hundreds of people were killed. William S. Richard, the British consul, was killed in an attack made by the Bedouins on the various consulates at Jiddah, on May 30, 1895, for which the Turkish government was compelled by the powers to make prompt apology and reparation. The Turkish government has had numerous revolts to deal with during the last decade. Prominently among these were the Cretan affair; the Macedonian rising; the revolts in Arabia, Muscat and among the Druses; and the Armenian troubles, which have caused much sympathy the world over, especially in America and Great Britain. The reason the powers have been unable to deal with these questions in a satisfactory manner is briefly this: An attack on Turkey would cause a general upheaval in Europe, which might result in an unsatisfactory distribution of Turkish territory; hence, diplomacy endeavors to avert the conflict.

Troubles began in Armenia when the Turkish government attempted to suppress the national movement to revive the ancient Armenian monarchy, and the desire of the natives to worship according to their custom. Oppressive measures were begun in 1888, when attacks were made on the Christians by the Kurds, Circassians, and Mussulmans. Two years later the Armenians were forbidden the right of meeting, even in their own churches. Again in 1893 robbery, riots, and other deeds of violence were perpetrated. The Evangelical School, an American institution in Mersivan, was destroyed. The American Missionary Society received full compensation from the Turkish government for this outrage. Some of the natives were killed and others banished. In February, 1894, occurred the "riot" in which the Turkish police at Yuzgat were overpowered after they had killed 30 and wounded 50 rioters. Further troubles arose from different immediate causes and riots were numerous, revolting tortures were practiced, the Turkish soldiers killed hundreds, churches were desecrated, villages were burned, infants were thrown into the river, and the commanding officers selected female slaves for their harems. It was esti-

mated that nearly 5,000 Armenians were killed in these encounters, and about 3,000 were taken prisoners. The Armenians were greatly encouraged in Sept., 1895, when the British squadron which had been stationed at Salonica was moved to Lemnos, at the entrance of the Dardanelles. The death of Garabad in July, the attack on the American school at Tarsus in August, the murder of several Armenians as spies in Constantinople, and other deeds of violence were attributed to the Armenian "revolutionists." Eight hundred Armenians were killed by the Turks in a brutal outrage at Trebizond. The number of Armenians slaughtered during this month was nearly 9,000, and there was plenty of foundation for the belief which had gained considerable ground that the Sultan had tacitly sanctioned the extermination of the Armenians. It is believed that 2,500 Armenian villages were destroyed and half of the agricultural population homeless and starving. Permission was granted the powers to place a second vessel at Constantinople Dec. 10. About this time the Armenians became very aggressive and made numerous attacks on Turkish villages, and 20,000 Turkish troops were ordered to advance upon Zeitoun. The town was besieged and finally evacuated by the insurgents. In a battle between the Zeitounlis and the Turks in January, 1896, the former were victors, but the Armenians surrendered in Feb., after an heroic defense.

In 1896, $116,000 were distributed in relief work in Armenia by Clara Barton, president of the American Red Cross Society. Mahmond Pasha was appointed governor of Zeitoun April 15, 1896. This was contrary to an agreement that the governor of that place should be a Christian. The following details regarding the Armenian massacres were published by the American missionaries in April, 1896: 26,990 persons were in need; 6,029 houses were plundered; 1,861 houses were burned; 75 churches, chapels, etc., burned or damaged; 16 people forced to marry Turks; 2,300 rapes committed; 7,676 people converted by force; 1,315 people wounded; 829 miscarriages; 280 killed in field and highways; 56 persons burned; 1,014 died from hunger and cold; 23 committed suicide; 1,922 martyrs; 4,014 total deaths; and $7,268,605 worth of property destroyed. These awful massacres continued at intervals through 1896 and 1897. At the present time very little trouble is reported from Armenia, and it is to be hoped that none of the cruelties will be repeated.

For an extended account of the war with Greece in 1897, in which Turkey was victorious, see *Greece.*

Ottumwa, Wapello co., Ia., on Des Moines River, 75 mi. w. by n. of Burlington. Railroads: C. B. & Q., and four other roads. It has extensive water power and is the great trade and manufacturing center of southern Iowa. Industries include iron works, rubber goods, machinery, cutlery, iron drills, boiler and stove works, cigar factories, and a large pork-packing establishment. It is the center of the great Iowa coal fields. Population, 1900, 18,197.

Oudh (or Oude) (oud), a province of British India, bounded on the n. by Nepaul, and on other sides by the Northwest Provinces; area 24,246 sq. mi. Oudh is a vast alluvial plain, watered by the Gogra, Gumti, Kapti, and Ganges. It is for the most part highly fertile, and wheat, barley, rice, sugar, indigo, and others of the richest products of India, are raised in large quantities. Oudh, formerly a Mogul province, became subordinate to the British after the battle of Kalpee, in 1765. In 1856 complaints of the misgovernment of the king of Oudh led to the annexation of the country to the British dominions. This measure, however, produced much dissatisfaction, and when, in 1857, the mutiny broke out, most of the Oudh sepoys joined it, and the siege of Lucknow resulted. Since the pacification of 1858, schools and courts of justice have been established, and railways have been opened. In 1877 Oudh was partially amalgamated with the Northwest Provinces by the unification of the two offices of chief commissioner and lieutenant governor, but for most administrative purposes it remains a separate province. Lucknow is the capital, and the main center of population and manufactures. Pop. 11,387,741 (mostly Hindus).

Oudh (formerly Ayodhya), an ancient town in Faizabad district, Oudh, adjacent to Faizabad, on the river Gogra. In remote antiquity it was one of the largest and most magnificent of Indian cities, and is famous as the early home of Buddhism and its modern representative, Jainism. A great fair, attended by about 500,000 people, is held every year. Pop. 11,643.

Oudinot (ö-di-nō), CHARLES NICOLAS (1767–1847), duke of Reggio, peer and marshal of France. In 1804 Napoleon gave him the command of a grenadier corps of 10,000 men, which was to form the advance guard of the main army. At the head of these troops he performed many exploits, winning the battle especially of Ostrolenka, and deciding the fate of three great battles, Austerlitz, Friedland, and Wagram. After the last-named battle Napoleon made him a marshal and duke of Reggio, and gave him an estate worth $20,000 a year. In the campaign of 1813 he was defeated at Grossbeeren and Dennewitz. In the campaign of 1814 he took an active part and was wounded for the twenty-third time. After Napoleon's abdication he gave in his adhesion to the Bourbons, to whom he ever afterward remained faithful, and who heaped upon him every honor.

Ouida (wē'da). See *Ramée, Louisa de la.*

Ouless (ou'les), WALTER WILLIAM, English painter, b. at St. Helier's, Jersey (1848). He studied at the Royal Academy, and began as a painter of *genre,* but has distinguished himself chiefly in portraiture. He was elected R. A. in 1881. Darwin, Newman, Lord Selborne, Sir Fred. Roberts, Cardinal Manning, Samuel Morley, M. P., and other celebrities have been among his sitters.

Ounce (Latin, *uncia,* a twelfth part of any

magnitude), in Troy weight is the twelfth part of a pound, and weighs 480 grains; in avoirdupois weight is the 16th part of a pound, and weighs 437½ grains Troy.

Ounce, one of the carnivora, found in Northern Africa, Arabia, Persia, India, and China. The length of the body is about 3½ ft., the tail measuring about 2 ft. It is a large cat, resembling the leopard and panther, but with a longer and more hairy tail and a thicker fur, somewhat less in size, and not so fierce and dangerous. In some places it is trained to hunt, like the cheetah.

Ou'rebi, an antelope of South Africa, found in great numbers in the open plains, and much hunted for its flesh. It is from 2 to 3 ft. high, of a pale dun color, and the male has sharp, strong, and deeply ringed horns.

Ouro-Preto, a town of Brazil, capital of the province of Minas-Geraes, 190 mi. n.n.w. of Rio de Janeiro. It was formerly one of the great mining centers of Brazil, but its gold mines are now nearly exhausted. Pop. 22,000.

Ouse (öz), a river of Yorkshire, England, formed by the junction of the Swale with the Ure near Boroughbridge; it flows southeast past York, Selby, and Goole, 8 mi. e. of which it unites with the Trent to form the estuary of the Humber. Its total course is 60 mi., for the last 45 of which (or to York) it is navigable.

Ouse (öz), GREAT, a river of England, rises near Brackley in the county of Northampton, flows in a general northeasterly direction, and falls into the Wash at King's Lynn, after a course of about 160 mi., for the latter two thirds of which it is navigable.

Ouseley, REV. SIR FREDERICK ARTHUR GORE, BART (1825–1889), English composer. He exhibited from childhood high musical ability, took the degree of Bachelor of Music at Oxford in 1850, and of Doctor in 1855, and the same year was appointed precentor of Hereford Cathedral. His works include treatises on *Harmony*, on *Counterpoint* and *Fugue*, and on *Musical Form* and general composition, and he wrote much church music.

Outram (ou'tram), LIEUTENANT GENERAL SIR JAMES (1803–1863), son of Benjamin Outram, was b. at Butterley Hall, Derbyshire, Eng. In 1828 he was selected to undertake a mission to the wild hill tribes of the Bombay presidency, a task in which he acquitted himself with credit. As adjutant to Lord Keane he took part in the Afghan War of 1839, and distinguished himself at the capture of Khelat, and by his dangerous ride disguised as a native devotee through the enemy's country to Kurrachee (1840). In 1856 he was nominated chief commissioner of Oudh. He was commander in chief of the British forces in the Persian War of 1856-57, and from Persia was summoned to India to aid in suppressing the mutiny. Although of higher rank than Havelock, whom he joined with reinforcements at Cawnpore in September, 1857, he fought under him till Lucknow was relieved by Sir Colin Campbell. In the following March he commanded the first division of infantry when Sir Colin finally regained possession of Lucknow. The shattered state of his health compelled him to return to England in 1860; he d. at Pau and was buried in Westminster Abbey.

Ouzel (ou'zl), a genus of perching birds, included in the family of the thrushes. The American water ouzel or dipper inhabits the vicinity of streams in the Rocky Mountains from British America to Mexico. The common or ring ouzel is a European bird whose specific name is derived from the presence of a broad semilunar patch or stripe of white extending across its breast. Ouzel is also an older or poetical name for the blackbird.

Ovam'pos, a collection of black tribes of Southwest Africa, occupying the exceedingly fertile country which lies south of the Cunene River between 14° and 18° east lon., and north of Damara-land. These black tribes resemble the Kaffirs and Damaras in feature, and by many are supposed to be a connecting link between negroes and Kaffirs. Cattle forms the wealth of the Ovampo tribes, each of which has its own hereditary chief. They are also good agriculturists, and have made considerable progress in various arts.

Oven Birds, birds belonging to the family of Creepers, found in South America. They are all of small size, and feed upon seeds, fruits, and insects. Their popular name is derived from the form of their nest, which is dome-shaped, and built of tough clay or mud with a winding entrance.

Ovens River, a river in the northeast of the Australian colony of Victoria, a tributary of the Murray. The district is an important gold mining and agricultural one.

Overijssel (o'vêr-ī-sêl) (or Overyssel), a province of the Netherlands; area 1,283 sq. mi. Except a strip along the Ijssel, presenting good arable and meadow land, the surface is mostly a sandy flat relieved by hillocks, and the principal industry is stock raising and dairy farming. Chief towns, Zwolle, Deventer, Almelo, and Kampen. Pop. 300,493.

Overshot Wheel, a wheel driven by water shot over from the top. The buckets of the wheel receive the water as nearly as possible, at the top, and retain it until they approach the lowest point of the descent. The water acts principally by its gravity, though some effect is of course due to the velocity with which it arrives.

Ovid (in full, PUBLIUS OVIDIUS NASO) (43 B. C.–18 A. D.), a celebrated Roman poet. He enjoyed a careful education, which was completed at Athens, where he gained a thorough knowledge of the Greek language. He afterward traveled in Asia and Sicily. He never entered the senate, although by birth entitled to that dignity, but filled one or two unimportant public offices. Till his fiftieth year he continued to reside at Rome, enjoying the friendship of a large circle of distinguished men. By an edict of Augustus, however (A. D. 8), he was commanded to leave Rome for Tomi, a town on the inhospitable shores of the Black Sea, near the mouths of the Danube. It is impossible now to come to any certain conclusion as to the cause of this banishment,

that given in the edict—the publication of the *Art of Love*—being merely a pretext, the poem having been in circulation ten years previously. The real cause may have been his intrigue with Julia, the clever but dissolute daughter of Augustus, whom he is supposed to have celebrated under the name of Corinna; or it may have been his complicity in the intrigue of Julïa, the granddaughter of Augustus, with Silanus. The change from the luxurious life of a Roman gallant to that of an exile among barbarians whose very language was unknown to him must have been far from agreeable, and we find him addressing humble entreaties to the imperial court to shorten the term or change the place of banishment; but these entreaties, backed up by those of his friends in Rome, were of no avail; and Ovid d. at Tomi. He had been three times married. His works include *Amorum Libri III*, love elegies; *Epistolæ Herodium*, letters of heroines to their lovers or husbands; *Ars Amatoria, Art of Love; Remedia Amoris, Love Remedies; The Metamorphoses*, in fifteen books *Fasti*, a sort of poetical calendar; *Tristia; Epistolæ ex Ponto, Epistles from Pontus; etc.*

Oviedo (ō-vi-ā′ *dō*), a town of Spain, capital of a province of same name, 230 mi. n.w. of Madrid. It was founded in 762, has a fourteenth-century cathedral and a university, and manufactures of hats, arms, napery, etc. Pop. 35,609. The province, area 4,080 sq. mi., pop. 596,856, is situated on the Bay of Biscay, and bounded by the provinces of Santander, Leon, and Lugo.

Oviedo y Valdez (ō-vi-ā′ *dō* ē vål-*d*eth′), Gonzalo Fernandez de (1478–1557), a Spanish historian, brought up as a page at the court of Ferdinand and Isabella. In 1514 he received a government appointment in the newly-discovered island of Hispaniola, and with few intervals spent the rest of his life there. Named by Charles V, historiographer of the Indies, he wrote his *Historia General y Natural de las Indias Occidentales.* This and his *Quinquagenas* are two works of great historical value. He d. at Valladolid.

Ovum, the "egg" or essential product of the female reproductive system, which, after impregnation by contact with the semen or essential fluid of the male, is capable of developing into a new and independent being.

Owego, Tioga co., N. Y., on Susquehanna River, 21 mi. w. of Binghampton. Railroads: Erie; D. L. & W.; and Lehigh Valley. Industries: wagon co., several flouring mills, iron foundry, harness factory, and the manufacture of grain drills. The village was first settled in 1785. Pop. 1900, 5,039.

Owen, Sir Richard (1804–1892), K. C. B., comparative anatomist and palæontologist, was b. at Lancaster, and educated at Lancaster Grammar School and the schools of Edinburgh, Paris, and London. Having settled in the metropolis he became assistant curator of the Hunterian Museum. In 1834 he was appointed professor of comparative anatomy at St. Bartholomew's Hospital; in 1836 professor in anatomy and physiology at the Royal College of Surgeons, and in 1856 superintendent of the natural history department in the British Museum, from which last post he retired in 1883. Owen is acknowledged to be the greatest palæontologist since Cuvier, and as a comparative anatomist a worthy successor to Hunter. He was a voluminous writer on his special subjects, and an honorary fellow of nearly every learned society of America and Europe. Among his works are *Lectures on the Comparative Anatomy of the Invertebrate Animals; Lectures on the Comparative Anatomy of the Vertebrate Animals; History of British Fossil Mammals and Birds.*

Owen, Robert (1771-1858), an English social reformer. In 1899 he organized a company which bought the cotton mills at New Lanark. Owen as manager instituted a liberal and progressive policy towards his employes, which soon attracted wide attention. He believed that character is wholly the result of environment, and also was a believer in communism. He founded several unsuccessful communities based upon his ideas, among them one at New Harmony, Ind. Later he returned to England and became an ardent socialist and spiritualist.

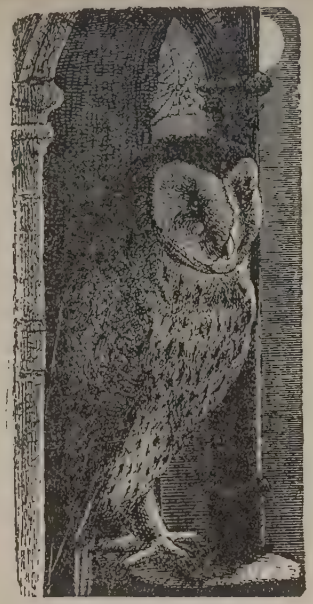
Owensboro, county seat of Daviess co., Ky., 150 m. s. w. of Louisville; on the Ohio river, and on the L. & N. and the Louisv., St. L. & Texas railways. Industries: cellulose factory, planing and flour mills, foundries, distilleries, etc. The city contains a female college, and is an important shipping point for coal and tobacco. First settled in 1798. Pop. 1900, 13,189.

Owen Sound, Ontario, Canada, on the Canadian Pacific Railway. Pop. 7,497.

Owl Parrot, the type and only known representative of a peculiar group of the parrot family, is a large bird, a native of the South Pacific Islands, and especially of New Zealand. In aspect and in nocturnal habits it resembles the owl. It feeds on roots, which it digs out of the earth with its hooked beak. It seldom flies; it is generally to be seen resting in hollow stumps and logs, and is said to hibernate, every year attaining a greater development, in caves.

Owls, a group of birds forming a well-defined family which in itself represents the nocturnal section of the order of Raptores or Birds of Prey. The head is large and well covered with feathers, part of which are generally arranged around the eyes in circular discs, and in some species form horn-like tufts on the upper surface of the head. The beak is short, strongly curved, and hooked. The ears are generally of large size, prominent, and in many cases provided with a kind of fleshy valve or lid, and their sense of hearing is exceedingly acute. The eyes are very prominent and full, and project forward, the pupils being especially well developed—a structure enabling the owls to see well at dusk or in the dark. The plumage is of a soft downy character, rendering their flight almost noiseless. The tarsi are feathered, generally to the very base of the claws, but some forms, espe-

1. Large White Owl (Nyctea nivia).



2. Veiled Owl (Strix flammea).

3. Horned Owl, or Bubo (Asio scops).

4. Largest kind of Horned Owl (Bubo maximus).

5. Tawny, or Wood Owl (Syrnium aluco).
6. Forest Owl (Otus vulgaris).

cially those of fish-catching habits, have the toes and even the tarsi bare. The toes are arranged three backward and three forward; but the outer toe can be turned backward at will. and the feet thus converted into hand-like or prehensile organs. In habits, most species of owls are nocturnal, flying about during the night, and preying upon the smaller quadrupeds, nocturnal insects, and upon the smaller birds. Mice in particular form a large part of their food. During the day they inhabit the crevices of rocks, the nooks and crannies of old or ruined buildings, or the hollows of trees; and in these situations the nests are constructed. They vary greatly in size, the smallest not being larger than a thrush. In their distribution the owls occur very generally over the habitable globe, both worlds possessing typical representatives of the group. The common white or barn owl is the owl which has the greatest geographical range, inhabiting almost every country in the world. The tawny or brown owl is strictly a woodland bird, building its nest in holes of trees. The genus *Asio* contains the so-called horned owls, distinguished by elongated horn-like tufts of feathers on the head. The long-eared owl appears to be common to both America and Europe. It inhabits woods. The short-eared owl frequents heaths, moors, and the open country generally to the exclusion of woods. It has an enormous geographical range. The eagle owl occurs in Norway, Sweden, and Lapland, and over the continent of Europe to the Mediterranean. A similar species extends over the whole of North America. Owls of diurnal habits are the hawk owl and the snowy owl. The hawk mostly inhabits the Arctic regions, but migrates southward in winter, as does the snowy owl, which is remarkable for its large size and snowy plumage. The little owl, the bird of Pallas Athena, is spread throughout the greater part of Europe. One of the most remarkable of owls is the burrowing owl of America and the West Indies, which inhabits the burrows of the marmots or prairie-dogs.

Barn Owl.

Owosso, Shiawassee co., Mich., on Shiawassee River, 80 mi. n.w. of Detroit. Railroads: Michigan Central; Grand Trunk, D. & M. division; Ann Arbor, T. S. & M. Industries: carriage works, two iron foundries, furniture, casket, table and other factories, and car shops. Surrounding country agricultural. The town was first settled in 1831, and became a city in 1859. Pop. 1900, 8,696.

Ox, the general name of certain well-known ruminant quadrupeds. The characters are: horns hollow, supported on a bony core, and curved outward in the form of crescents; there are eight incisor teeth in the under jaw, but none in the upper; there are no canines or dog teeth; the naked muffle is broad. The species are the common ox; the bison of Europe; the buffalo of North America; the buffalo of the eastern continent: the Cape buffalo; the yak of Thibet, etc. See *Bison*, *Buffalo*, *Yak*, etc. The common ox is one of the most valuable of our domestic animals. Its flesh is the principal article of animal food; and there is scarcely any part of the animal that is not useful to mankind; the skin, the horns, the bones, the blood, the hair, and the very refuse of all these, have their separate uses. Having been specially domesticated by man from a stock which it is probably impossible to trace, the result has been the formation of very many breeds, races, or permanent varieties, some of which are valued for their flesh and hides, some for the richness and abundance of their milk, while others are in great repute both for beef and milk. The ox is used in many parts of the world as a beast of draught. The name ox is used also in a more restricted sense to signify the male of the bovine genus castrated, and full grown, or nearly so. The young castrated male is called a *steer*. He is called an *ox-calf* or *bull-calf* until he is a year old, and a *steer* until he is four years old. The same animal not castrated is called a *bull*. There are several other varieties, as the Indian or zebu, with a hump on its back, the Abyssinian, Madagascar, and South African.

Oxal'ic Acid, an acid which occurs, combined sometimes with potassium or sodium, at other times with calcium, in wood sorrel and other plants; and also in the animal body, especially in urine, in urinary deposits, and in calculi. Many processes of oxidation of organic bodies produce this substance. Thus sugar, starch, cellulose, etc., yield oxalic acid when fused with caustic potash, or when treated with strong nitric acid. Sawdust is very much used for producing the acid. Oxalic acid is a solid substance, which crystallizes in four-sided prisms, the sides of which are alternately broad and narrow, and the summits dihedral. They are efflorescent in dry air, but attract a little humidity if it be damp. They are soluble in water, and their acidity is so great that, when dissolved in 3,600 times their weight of water, the solution reddens litmus paper, and is perceptibly acid to the taste. Oxalic acid is used chiefly as a discharging agent in certain styles of calico printing, for whitening leather, as in boot tops, and for removing ink and iron mold from wood and linen. It is a violent poison. *Oxalates* are compounds of oxalic acid with bases; one of them, binoxalate of potash, is well known as salts of sorrel or salts of lemon.

Oxenstjerna, Axel Count (1583–1654), Swedish statesman, studied theology at Ros-

tock, Wittenberg, and Jena; and in 1602, after visiting most of the German courts, returned to Sweden and entered the service of Charles IX. In 1608 he was admitted into the senate; and on the accession of Gustavus Adolphus, in 1611, he was made chancellor. He accompanied Gustavus Adolphus during his campaigns in Germany, taking charge of all diplomatic affairs; and on the fall of his master at Lützen (1632) he was recognized, at a congress assembled at Heilbronn, as the head of the Protestant League. This league was held together and supported solely by his influence and wisdom, and in 1636 he returned to Sweden after an absence of ten years, laid down his extraordinary powers, and took his seat in the senate as chancellor of the kingdom and one of the five guardians of the queen. In 1645 he assisted in the negotiations with Denmark at Bromsebro, and on his return was created count by Queen Christina, whose determination to abdicate the crown he strongly opposed.

Oxford, a city and county borough in England, capital of Oxford county, and seat of one of the most celebrated universities in the world, is situated about 50 mi. w.n.w. London, on a gentle acclivity between the Cherwell and the Thames, here called the Isis. The oldest building is the castle keep, built in the time of William the Conqueror and still all but entire. Of the university buildings the most remarkable are Christ's Church, the largest and grandest of all the colleges; Magdalen College, considered to be the most beautiful and complete of all; Baliol College; Brasenose College; and New College (more than 500 years old), largely consisting of the original buildings, and especially noted for its gardens and cloisters; the new examination schools, new museum, Bodleian Library, Radcliffe Library, and other buildings belonging to the university. Oxford depends mostly on the university, and on its attractions as a place of residence. Pop. 45,741. The county is bounded by Northampton, Warwick, Gloucester, Berks, and Buckingham, area 483,621 acres. Pop. 185,938.

Oxford University, one of the two great English universities, established in the Middle Ages, and situated in the city of Oxford (which see). Like Cambridge it embraces a number of colleges forming distinct corporations, of which the oldest is believed to be University College, dating from 1253, though Merton College was the first to adopt the collegiate system proper. The following list contains the names of the colleges, in the order in which they were founded: University College, Baliol College, Merton College, Exeter College, Oriel College, Queen's College, New College, Lincoln College, All Souls' College, Magdalen College, Brasenose College, Corpus Christi College, Christ Church College, Trinity College, St. John's College, Jesus College, Wadham College, Pembroke College, Worcester College, Keble College, Hertford College. There are also two "Halls," St. Mary Hall and St. Edmund Hall, which are similar institutions, but differ from the colleges in not being corporate bodies.

Oxford University is an institution of quite the same character as that of Cambridge. See *Cambridge, University of.* Most of the students belong to and reside in some college (or hall), but since 1869 a certain number have been admitted without belonging to any of these institutions. The students receive most of their instruction from tutors attached to the individual colleges, and those of each college dine together in the college hall and attend the college chapel. The ordinary students are called "commoners." The style or title by which the corporation is known is The Chancellor, Masters, and Scholars of the University of Oxford. The head of the university is the chancellor. The chief governing bodies are the House of Convocation, the Congregation of the University, and the Hebdomadal Council. The House of Convocation, which includes all doctors and masters whose names are on the register, elects to nearly all the offices in the gift of the university; gives the final sanction to all new statutes; transacts nearly all the formal business of the university as a corporate body; and elects the parliamentary representatives. The Congregation of the University, which includes professors and other officials and all resident members of Convocation, can amend, confirm, or reject legislative proposals laid before it, but all these must originate with the Hebdomadal Council, which consists of about twenty members, partly official, but mostly elected, and which meets every week in term time. The office of chancellor is almost purely honorary, the vice chancellor is in fact the supreme executive and judicial authority of the university. Two proctors are chosen yearly to maintain the discipline of the university. The university is open without respect of birth, age, or creed, to all who have passed the necessary examinations or other tests. Students enter as commoners or as "scholars" or "exhibitioners," according as they obtain some of the numerous scholarships or exhibitions which may be competed for. There are four terms or periods of study, known as Michaelmas, Hilary or Lent, Easter, and Trinity or Act. The two latter have no interval between them, so that the terms of residence are three of about eight weeks each. The degrees conferred are those of Bachelor and Master in arts, and Bachelor and Doctor in music, medicine, civil law, and divinity. Twelve terms of residence are required for the ordinary degree of B. A. No further residence is necessary for any degree, and no residence whatever is required for degrees in music. Candidates for the degree of B.A. must pass three distinct examinations: Responsions (known among undergraduates as the "Little Go" or "Smalls") before the masters of the schools; first public examination before the moderators ("Moderation"); and the second public examination before the public examiners ("Greats"). If the student wishes to take his degree with "honors" a residence of four years is usually necessary. Honors may be taken in *literæ humaniores* (classics, ancient history, and philosophy),

mathematics, jurisprudence, modern history, theology, natural science, and Oriental studies. Any B.A. may proceed to the degree of M.A. without further examination or exercise, in the twenty-seventh term from his matriculation, provided he has kept his name on the books of some college or hall, or upon the register of unattached students for a period of twenty-six terms. In the case of all other degrees (except honorary ones) some examination or exercise is necessary. Women were admitted to the examinations in 1884, but do not receive degrees. Three colleges for women have been established: Somerville Hall, Lady Margaret Hall, and St. Hugh's Hall. Mansfield College, for the education of men for the nonconformist ministry, was established in 1888. The total number of students is about 3,000. The total number of professorships, etc., in the university is about fifty. The institutions connected with the university include, the Bodleian Library (the second in the kingdom), the Ashmolean Museum, Botanic Gardens, Taylor Institution for modern languages, University Museum, Radcliffe Library, Observatory, and Indian Institute. Affiliated colleges are, St. David's College, Lampeter (1880); University College, Nottingham (1882); and Firth College, Sheffield (1886). The university sends two members to Parliament.

Oxlip, a kind of primrose, so called from some resemblance in the flowers to the lips of an ox, and intermediate between the primrose and cowslip.

Oxus (Amoo, Amoo-Daria, or Jihoon), a large river in Central Asia, which has its sources between the Thian Shan and Hindu Kush ranges in the elevated ranges known as the Pamir, flows w. through a broad valley, receiving many affluents, and n.w. through the deserts of Turkestan, to the southern extremity of the Sea of Aral, where it forms an extensive marshy delta. The principal head stream of the Oxus is by some considered to be the Panja River, which rises in a lake of the Great Pamir, at a height of 13,900 ft. The Oxus for a considerable distance forms the boundary between Afghanistan and Bokhara. Total course 1,300 mi.

Oxygen, a gas which is the most widely distributed of all the elements. Eight-ninths, by weight, of water, one-fourth of air, and about one-half of silica, chalk, and alumina consist of oxygen. It enters into the constitution of nearly all the important rocks and minerals; it exists in the tissues and blood of animals; without it we could not live, and by its agency disintegration of the animal frame is carried on after death. All processes of respiration are carried on through the agency of oxygen, all ordinary processes of burning and of producing light are possible only in the presence of this gas. Oxygen was first isolated in 1774 by Joseph Priestley who gave to the new gas which he had discovered the name of *dephlogisticated air*. Lavoisier, the year following Priestley's discovery, put forward the opinion that the new gas was identical with the substance which exists in common air and gave it the name of oxygen —from the Greek *oxys*, acid, and root *gen* to produce—because he supposed that it was present as the active constituent in all acids; modern experiments, however, prove that it is not necessary in all cases to acidity or combustion. Oxygen is invisible, inodorous, and tasteless; it is the least refractive, but the most magnetic of all the gases; it is rather heavier than air, having the specific gravity of 1.1056, referred to air as 1.00; it is soluble in water to the extent of about three volumes in 100 volumes of water at ordinary temperatures. Oxygen was liquefied for the first time in 1877 by the application of intense cold and pressure; it has even been solidified. It is possessed of very marked chemical activity, having a powerful attraction for most of the simple substances, the act of combining with which is called oxidation. Some substances when brought into contact with this gas unite with it so violently as to produce light and heat; in other cases oxidation is much more gradual, as in the rusting of metals. The presence of oxygen is, so far as we know, one of the physical conditions of life. In inspiring we receive into the lungs a supply of oxygen; this oxygen is carried by the blood to the various parts of the body, and there deposited to do its work of tissue forming, etc.; the deoxygenated blood returns to the lungs, and again receives a fresh supply of the necessary oxygen. Trees and plants evolve oxygen, which is formed by the decomposition of the carbonic acid absorbed by the leaves from the atmosphere. This is due to the action of the sun's rays and the chlorophyll or green coloring matter of the leaves. When oxygen unites with another element the product is called an *oxide*. The oxides form a most important series of chemical compounds. The power of supporting combustion is one of the leading features of oxygen, and until the discovery of oxygen no well-founded explanation of the facts of combustion was known. Oxygen exists in another form different from that of the ordinary gas; in this form it exhibits many marked peculiarities. See *Ozone*.

Oxyhydrogen Light (or Lime Light), a brilliant light produced when a jet of mixed oxygen and hydrogen gas is ignited and directed on a solid piece of lime. It is commonly used in magic lantern exhibitions; and the two gases are kept in separate air-tight bags, or iron cylinders into which the gas is forced under very high pressure. From these receptacles, tubes conduct the gases to meet in a common jet.

Oxyrhynchus (-rin'kus), a celebrated Egyptian fish, sacred to the goddess Athor, and represented in sculptures and on coins. It was anciently embalmed.

Oyer and Terminer (Law).—The name of courts of criminal jurisdiction in the U. S., generally held at the same time with the Court of Quarter Sessions, and by the same judges, and which have power, as the terms imply, *to hear and determine* all treasons, felonies, and misdemeanors committed within their juris-

diction. The terms Oyer and Terminer are derived from the Old French.

Oyster, an edible mollusk, and a near ally of the mussels, etc. It belongs to the genus *Ostræa*, family *Ostræidæ*, the members of which are distinguished by the possession of an inequivalve shell, the one half or valve being larger than the other. The shell may be free, or attached to fixed objects, or may be simply imbedded in the mud. The foot is small and rudimentary, or may be wanting. A single (adductor) muscle for closing the shell is developed. The common oyster is the most familiar member of the genus. The fry or fertilized ova of the oyster are termed "spat," and enormous numbers of ova are produced by each individual from May or June to September—the spawning season. The spat being discharged, each embryo is found to consist of a little body inclosed within a minute but perfectly formed shell, and possessing vibratile filaments or cilia, by which the young animal at first swims freely about, and then attaches itself to some object. In about three years it attains its full growth. The oysters congregate together in their attached state to form large submarine tracts of "oyster beds," as they are termed. In America the beds of Maryland, of Virginia, of Georgia, and of Long Island, are celebrated; in Scotland the beds in the Firth of Forth; in France, those of Rochelle, Rochefort, Ré and Oléron, Cancale and Granville; in Denmark the Sleswick beds and those at the north point of Jutland. The most common American species is *O. virginiāna*, which is found on the Atlantic coast from the Gulf of St. Lawrence to the Gulf of Mexico. The most favorable bottom and locality for oyster beds

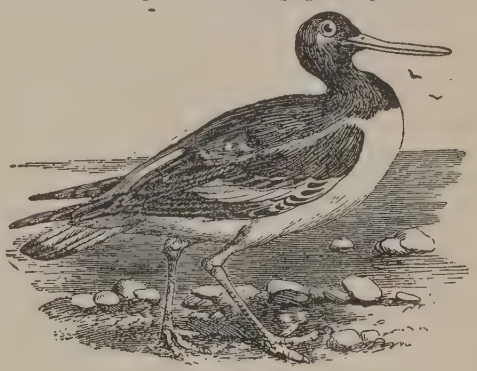
Diagram of Internal Structure.

The dorsal surface is downward, the anterior or head end to the left. *a*.—region where water enters and leaves the animal; the dark lines indicate where one mantle-flap has been cut away to expose the other structures; *b*.—gills; *c*.—margin of one of the mantle folds; *d*.—anterior part or hinge; *e*.—hood over mouth; *f*.—position of mouth; *g*, *h*.—labial palps; *i*.—end of intestine; *l*.—the closing muscle of shell; *m*.—position of the heart.

appear to be those situated in parts where the currents are not too strong, and where the sea bed is shelving, and covered by mud and gravel deposits.

The U. S. and France are the chief seats of the oyster industry. In the U. S. the oyster beds are still a source of great wealth, while in Europe the native beds have long since been destroyed. Large quantities of American oysters are now sent to Europe; and the American are generally larger than the European. In Europe the oyster industry is rapidly ceasing to be oyster fishery and becoming oyster culture. The pearl oyster of the Indian and Pacific oceans belongs to a different family.

Oyster Catcher, a bird belonging to the order of Grallatores (or Wading Birds), nearly allied to the plovers, and popularly known as



Oyster Catcher.

the "sea-pie." It is distinguished by its long, thin, wedge-shaped, orange-colored bill, and its black and white plumage.

Oza'ka. See *Osaka*.

Ozark Mountains, a chain intersecting in a southwest direction the states of Missouri and Arkansas; height about 1,400 ft.

Ozo'kerite, a fossil resin of a pleasantly aromatic odor, existing in the bituminous sandstones of the coal measures, and occurring chiefly in Galicia, in Austria. It contains carbon and hydrogen in the proportion of 86 per cent. of the former to 14 per cent. of the latter. When purified it forms a hard paraffin, from which excellent candies are manufactured. It is used to some extent as an adulterant of beeswax.

Ozone, a modified — technically an *allotropic* — form of oxygen. Two volumes of ozone contain three volumes of oxygen condensed to two volumes. Ozone exists in small quantities in pure country air, and is produced in various ways. When an electric machine is set in operation a peculiar smell may be perceived; after a discharge of lightning the same smell is perceptible. The substance which manifests this odor is ozone (from Greek *ozō*, I smell), and in each of those cases ozone is produced. Ozone acts as a very powerful oxidizer; for this reason it is of great service in the atmosphere, as it so readily oxidizes, and thus renders comparatively unhurtful, animal effluvia and other obnoxious products of animal or vegetable decomposition. Ozone rapidly bleaches indigo, converting it into a white substance called isatin, which contains more oxygen than the indigo itself.

P

P, the sixteenth letter and twelfth consonant in the English alphabet. It is one of the mutes and labials, and represents a sound produced by closely compressing the lips till the breath is collected, and then letting it issue.

Pachira (pa-kī'ra), a genus of tropical American trees allied to the baobab tree. The largest flowered species, *P. macrantha*, found in Brazil, attains a height of 100 ft., and has flowers 15 in. long. The plants are familiar in our hothouses under the name of *Carolinea.*

Pachuca (pä-chö'kä), a town of Mexico, capital of the state Hidalgo, in a rich silver mining region, about 8,200 ft. above the sea. Pop. 14,265.

Pacific Ocean (formerly called also the *South Sea*), that immense expanse of water which extends between the North and South American continents and Asia and Australia. It is the largest of the oceans, exceeding in compass the whole of the four continents taken together, and occupying more than a fourth part of the earth's area, and fully one half of its water surface. On the west it extends to the Indian Ocean, and has several more or less distinct seas connected with it—the China Sea, Yellow Sea, Sea of Japan, Sea of Okhotsk, etc.; on the north it communicates with the Arctic Ocean by Bering's Straits, on the south it is bounded by the Antarctic Ocean, and on the east it joins the Atlantic at Cape Horn. Within this enormous circumference it includes the numerous islands composing the groups of Australasia and Polynesia, and those adjoining America and Asia. The average depth of the Pacific appears to be greater than that of the Atlantic, and its bed more uniform. Recent soundings to the south of the Friendly Islands give a depth of from 4,295 to 4,430 fathoms (about five miles). The deepest soundings known are 4,475 fathoms s. of the Ladrone Islands, and 4,655 fathoms n. e. of Japan. In the Pacific the tides never attain the maximum heights for which some parts of the Atlantic and Indian Oceans are celebrated. On all the west coast of America the rise of the tide is usually below 10 ft., and only in the Bay of Panama does it vary from 13 ft. to 15 ft. The trade winds of the Pacific are not so regular in their limits as those of the Atlantic, and this irregularity extends over a much wider region in the case of the southeast trade wind than in the case of the northeast. The cause of this is the greater number of islands in the South Pacific Ocean, which, especially in the hot season, disturb the uniformity of atmospheric pressure by local condensations. The northeast trade wind remains the whole year through within the northern hemisphere. The southeast trade wind, on the other hand, advances beyond the equator, both in summer and winter still preserving its original direction. In the region stretching from New Guinea and the Solomon Islands southeastward, there are no regular winds. The zones of the two trade winds are separated by regions of calms and light winds, the limits of which vary of course with the varying limits of these zones. In the Chinese seas the terrible typhoon occasionally rages, and may occur at any season of the year. The Portuguese were the first Europeans who entered the Pacific, which they did from the east. Balboa, in 1513, discovered it from the summit of the mountains which traverse the Isthmus of Darien. Magellan sailed across it from east to west in 1520–21. Drake, Tasman, Behring, Anson, Byron, Bougainville, Cook, Vancouver, Lapérouse, and others, traversed it in different directions in the seventeenth and eighteenth centuries.

Pacific Railways. Previous to 1850 the greater portion of the railroads made were in the states bordering on the Atlantic, and were for the most part isolated lines employed for local traffic. A great development to this form of enterprise was given by the discovery of gold in California, and lines were rapidly pushed toward the center of the continent. The great Civil War at the commencement of the next decade emphasized the necessity of direct communication with the growing Pacific states to cement the Union, and government assistance was freely given both in land-grants and money to the two companies, the Union Pacific and Central Pacific, which, building respectively from the east and the west, met near Salt Lake City in May, 1869, the total length from the Missouri River to San Francisco being 1,700 mi. Since that date five transcontinental lines have been completed, including the Canadian Pacific Railway on British territory, which was completed, according to arrangement with the Canadian government, by a syndicate of London, Paris, and American capitalists, being opened for general traffic in June, 1886. Commencing at Montreal, the line goes on to Ottawa, thence round the north of the Great Lakes to Port Arthur at the head of Lake Superior, and thence to Winnipeg, Manitoba, thence to Stephen in the Rocky Mountains, then across British Columbia to Vancouver on the Pacific. The length of the line from Montreal to Vancouver is 2,909 mi., without counting side extensions and leased lines.

Packer, Asa (1806–1879), capitalist and philanthropist, was b. in Groton, Conn. He was member of Pennsylvania Legislature, county judge, projector of the Lehigh Valley R. R. He became the richest man in Pennsylvania. He served two terms in Congress. Lehigh University was liberally endowed by him.

Pacu'vius, Marcus (219–124 B.C.), ancient Roman tragic poet, b. at Brundusium, passed the greater part of his life at Rome, where he became famous both for his poetry and his

paintings, retired to Tarentum during his last years, and d. at the age of ninety. Only fragments of his tragedies exist.

Paddle Fish, a large fish allied to the sturgeons, so named from the elongated broad snout with which it stirs up the soft muddy bottom in search of food. It often reaches a length of from 5 to 6 ft. The paddle fishes are exclusively North American in their distribution, being found in the Mississippi, Ohio, and other great rivers of this continent.

Paderewski, Ignace Jan, b. in Poland in 1860. He received his musical education at Warsaw and Berlin and was made professor of music in the Conservatory of Music in Warsaw at the age of eighteen. At the age of twenty-four he was made professor in the Conservatory of Strasburg. Later he studied in Vienna and began professional tours. He has made four American tours, one in 1891, another in 1893, 1896 and 1899.

Pad'ua, a city in Italy, capital of the province of the same name, 22 mi. w. of Venice, on a low flat on the Bacchiglione, which flows through it in several branches and is crossed by numerous bridges. The houses are lofty, the streets narrow, and several of these, as well as some of the squares, are lined with mediæval arcades. Of recent times the town has been improved by the opening up of new and the widening of old streets. The buildings most deserving of notice are the town-house or Palazzo della Ragione; the large mosque-like church of St. Antonio; the church of the Annunziata; etc. The university was long renowned as the chief seat of law and medicine in Italy; and very many names famous in learning and art are connected with Padua, such as Galileo, Scaliger, Tasso, Giotto, Lippo Lippi, and Donatello. Under the Romans it was a flourishing municipal town, and its history follows the course of events common to most of the cities of Italy on the decline and fall of the Roman Empire. Latterly it was under the domination of Venice, whose fortunes it followed until 1866, when, with Venice, it became part of the kingdom of Italy. Pop. 47,334. The province of Padua has an area of 854 sq. mi., and pop. of 397,762.

Paducah, McCracken co., Ky., on Ohio River. Railroads: News & Miss. Val.; Pad. Penn. & Ala.; St. L., A. & T. H. Industries: railroad repair shops, saw and flour mills, foundries and machine shops, carriage factories, etc. Tobacco, corn, pork, iron, and other products are shipped largely. Pop. 1900, 19,446.

Paez (pä-eth'), José Antonio (1790–1873), one of the founders of South American independence, b. of Indian parents near Acarigua, Venezuela, entered the patriot army in 1810, rose to general of division in 1819, and took a leading part in the battle of Carabobo, which secured the independence of Colombia in 1821. At first he acted in concert with Bolivar, but in 1829 he placed himself at the head of the revolution which culminated in the independence of Venezuela, of which he was the first president. He d. in exile at New York.

Pagani'ni, Niccolò (1784–1840), a celebrated violinist, b. at Geneva. His first engagement was in 1805, at Lucca, where he found a patroness in Princess Eliza, Bonaparte's sister. In 1813 he left Lucca for Milan, and in 1828 visited Vienna. From this period his fame was world-wide. The wonder which he excited was caused not merely by the charm of his execution and his extraordinary skill, but also by his external appearance, which had something weird and even demoniacal in it.

Page, Thomas Nelson, b. in Virginia in 1853. He was educated at Washington and Lee University, and the University of Virginia. Later he practised law in Richmond. He has written a number of books among which are *Marse Chan*, *In Old Virginia*, *Two Little Confederates*, *Befo' de War*, *Among the Camps*, *Unc' Edinburg*, *Red Rock*, etc.

Paging Machine, a machine for printing consecutive numbers on the pages of a book, bank notes and checks, railway tickets, etc. Several machines of this kind have been invented, all of which consist essentially of a number of revolving disks bearing the ten digits in raised figures on their circumference, with various contrivances for making the first disk describe one tenth of a revolution after every figure is printed, for making the second disk describe one tenth of a revolution every time the first makes a complete revolution, and so on, as well as for supplying the figures with ink at each impression. Provision is also made for the printing of duplicate and alternate numbers if this is required.

Pago, an Austrian island in the Adriatic, on the coast of Dalmatia; area 81 sq. mi.; pop. 5,781.

Pago'da, the name given to Hindu and Buddhist temples. The temple proper is generally of pyramidal form, and of a number of stories, of great size and height, and embellished with extraordinary splendor. Connected with it may be various other structures, open courts, etc., the whole forming architecturally a very imposing group. Pagodas are numerous not only in Hindustan, but also in Burmah, Siam, and China. The statues in the temples are often of a colossal size.

Pahang', a state on the east coast of the Malay Peninsula; area 3,500 sq. mi.; pop. 20,000. By the treaty concluded between Great Britain and the sultan of Pahang in 1888 the control of the foreign relations of that state was conveyed to the government of the Straits Settlements; and Pahang is now practically a dependency of that colony.

Paine, Robert Treat (1731–1814), signer of the Declaration of Independence, was b. in Boston, Mass. He was delegate to Provincial and Continental Congresses. He held offices of attorney general of Massachusetts and Judge of Supreme Court; was an able judge.

Paine, Thomas (1737–1809), political and deistical writer, b. at Thetford, England. In 1774 emigrated to America, with a letter from Franklin. Paine threw himself heart and soul into the cause of the colonists, and his pamphlet entitled *Common Sense*, written to recom-

mend the separation of the colonies from Great Britain, and his subsequent periodical called the *Crisis*, gave him a title to be considered one of the founders of American independence. In 1787 he returned to England, and in answer to Burke's *Reflections on the French Revolution* wrote his *Rights of Man*. A prosecution was commenced against him as the author of that work, but while the trial was pending he was chosen member of the national convention for the department of Calais, and, making his escape, set off for France, where his *Rights of Man* had gained him great popularity, and arrived there in September, 1792. On the trial of Louis XVI he voted against the sentence of death, proposing his imprisonment during the war and his banishment afterward. This conduct offended the Jacobins, and toward the close of 1793 he was excluded from the convention, arrested, and committed to prison, where he lay for ten months, escaping the guillotine by an accident. Just before his confinement he had finished the first part of his work against revelation, entitled the *Age of Reason;* it was published in London and Paris in 1794, by which step he forfeited the countenance of the greater part of his American connections. He remained in France till August, 1802, when he embarked for America, where he spent the remainder of his life, occupied with financial questions and mechanical inventions. He d. at New York.

Painting is the art of representing the external facts of and objects in nature by means of color. A study of the art requires a knowledge of form, animate and inanimate; of perspective; and of light and shade. Considered in relation to the subjects treated, painting may be divided into decorative, historical, portrait, *genre* (scenes of common or domestic life), landscape with seascape, architectural, still life. According to the methods employed in the practise of the art it is termed oil, water color, fresco, tempera or distemper, and enamel painting, and in mosaics, on glass, porcelain, terra cotta, and ivory (this last being called miniature painting). Decorative works, usually in fresco or tempera, but sometimes in oil, are generally executed upon the parts of a building. For the basis of easel pictures, wood panels prepared with a coating of size and white were used solely up to the fourteenth century for both oil and tempera, and are still sparingly employed; but canvas covered with a priming of size and white lead, and tightly nailed over a wooden frame called a "stretcher," is now almost universally adopted for oil painting. For water colors paper alone is employed. The tools used by an artist are charcoal, colored crayons, and lead pencils for outline purposes; colors, a palette for holding the same, a palette knife for mixing them; brushes for laying them on; and an easel with adjustable heights for holding the canvass. A wooden manikin, with movable joints, and termed a "lay figure," is sometimes used on which to arrange costumes and draperies.

The term "oil colors" is employed to denominate colors ground with oil, and water colors

those wherein gum and glycerine have been employed. Both are ground solid, an oil medium being used in the first case and water in the second to thin out the colors when on the palette. Fresco painting is executed on wet plaster. Mosaic work is formed by small cubes of colored glass, called tesseræ, fixed in cement; in tempera the colors are mixed with white; in encaustic, wax is the medium employed; and in enamel the colors are fired. Egyptian, Greek, and early Roman paintings were executed in tempera; Byzantine art found its chief expression in mosaics, though tempera panels were executed; and early Christian art up to and partly including the fourteenth century adopted this last method. The vehicle employed in mixing the colors was a mixture of gum and white of egg, or the expressed juice of fig tree shoots. The introduction of oil painting was long attributed to the Van Eycks of Bruges (1380–1441), but painting in oil is known to have been practised at a much earlier period, and it is now generally held that the invention of the Van Eycks was the discovery of a drying vehicle with which to mix or thin their colors, in place of the slow drying oil previously in use. This new vehicle was composed of a thickened linseed oil mixed with a resinous varnish, and it was its introduction that effected so great a revolution in the art of painting.

History—Egypt and Greece.—The practise of painting extends back to remote ages. It comes first into notice among the Egyptians in the nineteenth century B.C., the most flourishing period being between 1400 B.C. and 525 B. C. With them the art was the offspring of religion, and was with sculpture, from which it cannot be separated, subordinate to architecture. The productions are found chiefly on the walls of tombs and temples, but also on mummy cases and rolls of papyrus. They consist chiefly of the representation of public events, sacrificial observances, and the affairs of everyday life. The work is purely conventional in character, and was executed according to a strict canon of rules under the supervision of the priesthood. Both outline and color were arbitrarily fixed, the figures and objects being rendered in profile and painted in perfectly pure flat tints, with no light or shade. The colors used are very simple, but the effect is often very harmonious, and with a strong sense of decorative composition. Although art is the natural product of man's mind, and cannot be assigned any particular commencement, it is nevertheless doubtless that Egyptian art slightly influenced that of Asia Minor, and strongly so that of Greece, in which country the arts attained to the highest excellence. This is proved by the testimony of historians, for no specimens of true Greek painting save those on vases, have come down to us. In Greece, as in Egypt, painting with sculpture were the handmaidens of architecture, the friezes, pediments, and statues of the temples being originally colored. The more celebrated of the Greek schools of painting were at Ægina, Sicyon, Corinth, and Athens; the chief mas-

ACTRESSES

Ellen Terry
Madame Modjeska

Sara Bernhardt
Julia Marlowe

Plate 26, Vol. III

ters being Cimon, Polygnotus, and Panœnus, who lived about the fifth century B. C. Apollodorus, same century, systematized a knowledge of light and shade, while Zeuxis and Parrhasius directed their efforts to the perfecting of an ideal human form. Timanthes, a tragic painter, lived in the next generation; and at the time of Alexander the Great appeared Apelles (350 B.C.), the greatest of all Greek portrait painters, and Protogenes, an animal painter. With the death of these two painters decline set in, and Greek art gave itself up to the pursuit of trifling and unworthy subjects. Greek painting seems to have been, in truth of effect and in light and shade, in no way inferior to work of the present day, although perspective as a science does not seem to have been practised.

Rome never had in ancient times an art that was indigenous, or produced a painter worthy of note. The conquest of Greece by the Romans brought an influx of Greek artists into Italy, and it was with their hands that the principal works of Roman art were produced. A number of specimens of ancient paintings have been discovered in the tombs and baths of Rome, at Pompeii, and at other places in Italy, chiefly in fresco and mosaic. Judging from these remains, which are known to have been produced when art was in a state of decadence, the ancients would seem to have possessed a great knowledge of the human figure, of animals, and of inanimate nature, and of their uses in art. Their skill as decorators has scarcely been surpassed. Their colors were used pure with a just treatment of light and shade, and the knowledge of perspective shown, is true, but limited in extent. During the first three centuries after Christ, painting under the new influence of Christianity was practised secretly in the catacombs under and around Rome. But with the establishment of Christianity by Constantine as the religion of the state, pagan art received its death-blow. Christian art was permitted to emerge, and was allowed to adorn its own churches in its own way. Mosaics, missal paintings, and a few panels are all that are left to us of this period. Notwithstanding the efforts made by several of the popes to encourage its growth by withdrawing certain limitations, especially as regards the use of the human figure, art sank lower and lower, until with the flood of barbarism which in the seventh century buried Italian civilization, the art of Christian Rome was practically extinguished.

Byzantium.—Meanwhile with the foundation of Byzantium by Constantine in 330 A.D., a Byzantine school of art had been steadily growing up. As to style, it manifested the old Greek ideals modified by Christianity, and had reached its highest point about the time that Roman art was at its lowest. At Byzantium, art had become Christian sooner and more entirely than at Rome. Like the art of ancient Egypt, however, it had grown, under the strict influence of the priesthood, mechanical and conventional, but was yet strong enough to send artists and teachers through Southern Europe. Their works are still to be seen at Ravenna, in Rome, in Palermo, and more especially in the church of St. Mark at Venice. All the Byzantine decorations are in mosaic, and are noteworthy for the splendor of their gilded backgrounds and for their grandeur of conception, though the figure drawing is weak, with no attempt at pure beauty. The Byzantine school was thus the immediate parent of the great schools of Italy, and of the Rhenish or old Cologne school in Germany.

Italy, Early Period.—The Italian painters could not, however, at once free themselves from the Byzantine tradition which compelled one painter to follow in the steps of his predecessor without referring to nature; and so this style was carried on in Italy by Byzantine artists and their Italian imitators up to the middle of the thirteenth century. The breaking through of this tradition and the great progress made by the arts in the thirteenth century, form part of a movement which has been termed the Renaissance or Revival, the arts being no longer representative merely, as heretofore, but becoming imitative.

Three cities of Italy, namely, Siena, Pisa, and Florence, share the honors of this revival, each boasting a school, and each possessing two or three great names and their consequent followers. The first regenerators were Guido of Siena, Giunta of Pisa, and Margaritone of Arezzo, whose works, though ugly and almost barbarous, yet show a departure from the stiffness of Byzantine tradition. Giovanni Cimabue, b. at Florence in 1240, may, however, be said to be the father of modern painting, and was the first to fairly free himself from traditional models; his works and those of his predecessors just named forming the transition from the Byzantine to the modern manner. His appearance marks an era in history, and after him come two painters, the one at Siena and the other at Florence, in each of whom appears the power of deriving an impression direct from nature. These were Duccio di Buoninsegna (1260–1320), whose masterpiece is still at Siena, and Giotto (1266–1337), a pupil and protégé of Cimabue, and of whose works examples are still to be seen in Florence, at Assisi, and at Padua. Of these two Giotto is by far the greater, and his immediate pupils and their successors constituted a school which exercised an influence throughout Italy. The rival school of Siena produced Simone Memmi (1284–1344), but died out owing to its exclusiveness. The works of all the artists of these two schools were executed either in fresco or in tempera, and although lacking in chiaroscuro and deficient in perspective, compensated largely for these defects by an earnestness, a devotion, and a spiritual significance which will forever make the fourteenth century memorable in the history of art. No other schools worthy of note existed elsewhere in Italy during this century, neither could the Flemish nor the German school be said to have had any distinct existence as such.

With the fifteenth century came the introduction of oil painting, and with it an all-round

improvement both in knowledge of technics and power of expression. To the earlier half of this century belong the great masters of religious art, the most noteworthy being Fra Angelico (1387–1455), who worked chiefly in Florence, and whose productions are full of the peculiar religious fervor characteristic of the painter. A knowledge of the exact sciences as applied to art gave an added impulse, and Paolo Uccelli (1396–1475) and Piero della Francesca (1415–92) divide the honor belonging to the perfecting of a system of perspective. The works of Masolino da Panicale (d. 1420) show the greatest advance yet made in the direction of chiaroscuro. Masaccio (1401–28), by his knowledge of the figure and by his treatment of groups with their proper force of light and shade and relief in appropriate surroundings, became the founder of the modern style. Andrea Verrochio (1432–88), the master of Leonardo da Vinci, promoted a knowledge of anatomy, and Ghirlandajo (1449–98), the master of Michael Angelo, may also be mentioned, both as goldsmith and as painter. These painters all belong to the Florentine school, but other schools were co-existent, notably that of Padua founded by Squarcione (1394–1474), whose pupil was Andrea Mantegna (1431–1506), an artist who takes rank among the greatest masters of painting. The Venetian school also arose under the influence of Bellini, Giovanni (1427–1516) and his brother Gentile (1429–1507), whose works, though somewhat hard and somewhat dry in texture, yet in color anticipate the great works of their pupils. The Umbrian school produced Pietro Perugino (1446–1524), a painter of the first rank and the master of Raphael. The Neapolitan school also began to be heard of. The Italian art work of the fifteenth century by its unconscious and spiritual meaning excelled much of that which was to follow. The latter, though carried to the highest pitch of perfection, lost much of the freshness and spontaneity possessed by the art of the earlier century.

Netherlands, Early Period. — Before speaking of the sixteenth century it were well to look elsewhere in Europe, and especially at the Netherlands, from whence had come the invention in oil painting, which so completely revolutionized technical methods. The discovery was made by the brothers Hubert and Jan Van Eyck of Bruges about the commencement of the fifteenth century, and carried to Italy by Antonello da Messina (1445–93). The greatest follower of this school was Hans Memling (1450–99), a comparison of whose works with those of his Italian contemporaries shows an excellence of technic and a power of expression not always in favor of the Southern artists.

Italy, Germany, Sixteenth Century.—The work of the sixteenth century is centered as much upon particular men as upon schools. Though many of the painters hereafter named were born in the latter half of the fifteenth century, their work separates itself so distinctly from that of their predecessors that it is the custom to consider it as belonging to the latter period.

The four great schools were at Florence, Rome, Parma, and Venice, and each furnished from its scholars a painter who was in himself the particular glory of his school. Heading the Florentine comes Leonardo da Vinci (1452–1519), who established himself at Milan, and was celebrated as a painter, sculptor, architect, and engineer, his chief pupil being Bernardino Luini (1470–1530). Then followed no man's style, but coming as a creator, we have Michael Angelo (1475–1564), combining in himself the highest powers in architecture, sculpture, and painting. He was followed in Florence by Fra Bartolommeo (1475–1517) and Andrea del Sarto (1488–1531). The Roman school, not indigenous, but a continuation of the Umbrian school before mentioned, centers itself round the third great name, that of Raphael Sanzio (1483–1520), aptly called the prince of painters, who with his pupils and assistants, the chief among them being Giulio Romano, constitute the Roman school. Parma contains the work of Correggio (1494–1534), generally known as the head of the Lombard school, an artist unrivaled for grace, and harmony of chiaroscuro. Lastly, Venice produced a school supreme in respect of color, and owing such power as it possesses entirely to the influence of the Bellini. The first name in this period is Giorgione (1476–1511); then comes Titian (1477–1576), who takes rank with the great masters of the Florentine and Roman schools; followed by Tintoretto (1512–94) and Paolo Veronese (1532–88), who with Titian stand for all that is greatest in this school. In the North the Flemish school had become rapidly Italianized, with a result best seen in the following century. In Germany the influence of the Flemish school had made itself felt, and had produced in Albert Dürer of Nuremberg (1471–1528) the most celebrated master of his time north of the Alps.

Italy, Germany, etc., Seventeenth Century.— The sixteenth century consummates the great age of modern art, an age that might justly be said to equal any period of Greek art. With the seventeenth century came the decline, brought about chiefly by the slavish imitation of the great painters of the preceding period, and art was only saved from extinction by a reaction headed by the Caracci. Their school, known as the Eclectic, was founded at Bologna by Ludovico (1555–1619), Agostino (1557–1607), and Annibale (1560–1609). Their principle was to unite a direct study of nature with a study of the excellencies of the great masters. To a certain extent the object was attained, and Guido Reni (1574–1642), Albani (1578–1660), and Domenichino (1581–1641), best illustrate in their works the results arrived at. Side by side with this school grew up that of the Naturalists at Naples founded by Caravaggio (1569–1609). Pietro da Cortona (1596–1669), the last of the Roman school, was the opponent of the Eclectic style. With the later Venetian school, which count Canaletto (1697–1768) and Tiepolo (1693–1770) among its disciples, the art of Italy may be said to have ended. Its seed spread itself and took root in France, and especially

in Flanders, where Rubens (1577–1640) had become its greatest exponent. In Holland, however, art had acquired a distinct individuality, first in Franz Hals (1584–1642), and above all in its typical painter Rembrandt (1607–69), both portrait painters distinguished for their portrait groups; also by its landscape and *genre* painters, of which two classes of subjects this school is the great exponent. Among its landscape painters are Van de Velde, Ruysdael, Hobbema, and Cuyp; and among its *genre* painters are Gerard Dow, Breughel, Teniers, and Van Ostade. The Spanish school, which stands alone in the prevailing religious ascetic character of its productions, and which in the preceding centuries had been influenced by Flemish and Italian painters, reached its greatest epoch in this century with Velasquez (1599–1660), one of the greatest of portrait painters, and Murillo (1613–80).

France, Sixteenth to Nineteenth Century.—The effect of Italian art in France remains to be noted. The school of France, influenced at first both by Flemish and by Italian art, finally inclined to the latter, and in the reign of Francis I (1515–47) a school was established at Fontainebleau and called by that name. Leonardo da Vinci worked in France, and Primaticcio carried on the unfinished work of Rosso (d. 1541). Jean Cousin (1501–89) may be called the founder of the French school as opposed to the Italianized version which began with Simon Vouet (1590–1649). The native school was, however, finally overcome by the Italian method. Nicholas Poussin (1594–1665), figure and landscape painter, one of the greatest painters France can claim; Claude Lorraine (1600–82) and Gasper Dughet or Poussin (1613–75), landscapists, are painters who, though born in France, yet worked in Italy, and stand apart from the followers of the then national style; as does also Eustache Lesueur (1617–55), sometimes called the French Raphael. This national style was coeval with the court of Louis XIV and representative of it, the chief exponents being Le Brun (1619–90), Mignard (1610–96), Du Fresnoy (1611–65), and Jouvenet (1644–1711). To continue the history into the eighteenth century, with France we find a steady deterioration both in technic and morality; the latter phase commenced by Watteau and Lancret, two painters truly French, and consummated by Boucher (1704–70). Greuze (1725–1805) and Vien (1716–1809) were the first to protest against the corrupt influence of Boucher, and were the precursors of the reform, of which David (1748–1825) was the great instigator, a man whose influence made itself felt throughout Europe. He insisted upon a return to the study of the antique, and his followers number a few distinguished men, notably Gros and Guerin. Géricault (1774–1829), a pupil of Guerin, was the first to break with the extreme classicism of the school of David, and Ingres (1780–1867), Delacroix (1798–1863), Scheffer (1795–1858), and Delaroche, noted for the reality of his historical subjects and the tenderness and pathos of his sacred pictures (1797–1856), are the most distinguished names of the more direct and romantic style initiated by him. Modern French landscape art, founded upon an impulse received from England, has had Decamps (1803–66), Rousseau (1812–67), Corot (1796–1875), and Millet (1815–75), as its chief exponents. The work of Regnault (1843–71) remarkably illustrates the tendencies of modern French painting. Bastien Lepage (1848–84), with his literal renderings of nature, strongly influences the younger British school; and Meissonier, Gerome, Bougereau, Constans, and Cabanel, and Puvis de Chavannes as a decorative artist, are some of the chief members of a school which is at the present time influencing the art of the world.

Germany, Holland, etc., Nineteenth Century.—Germany during the eighteenth century remained stationary in matters of art, but with the revival in France came a similar but slightly later movement in Germany, the precursors of which were Holzer (1709–40), a Tyrolese fresco painter, and Carstens (1754–98). The chief of the revivalists, however, was Overbeck (1789–1869), who, with a band of followers, founded a school at Rome in 1810, the principle animating whose work was that modern artists should only study the painters of the time preceding Raphael. Overbeck painted religious subjects, and worked both in fresco and oil. His works while possessing fine feeling are poor in color and weak in chiaroscuro. Chief among his pupils is Cornelius (1783–1867), one of the greatest of modern German painters, and whose work is best seen in Munich. Schadow (1789–1862) was a pupil of Cornelius. Schnorr von Carolsfeld (1794–1872) chose for his subjects the mediæval history and myths of Germany, and also produced an extensive series of illustrations of the Bible of great merit. Kaulbach (1805–1874), a great historical painter and pupil of Cornelius, shows in his work some of the worst faults of the modern German school. Lessing (1808–1880) is famous both for his historic and landscape pictures, and among living painters worthy of note are Gabriel Max, and Menzel in historic, Knaus Vautier, Metzler, and Bochmann, in genre, and Achenbach in landscape. In Dutch art of the present day the same taste but not the same power of execution prevails as in earlier times. Sea-pieces, landscapes, scenes of common life are still the chief subjects selected. Schotel and Scholfhart have distinguished themselves as landscape painters, Van Os, Van Stry, and Ommeganck as cattle and figure painters, while Josef Israels a painter of domestic scenes, with M. Maris and Mesdag are living artists. The influence of the French school is at present paramount in Belgium, as was the classicism introduced by David up to 1830. At that time a reaction was begun by Leys (1815–69), and followed up by Wappers (1803–74), painters who selected historical subjects of national interest. The work of reformation continued to be carried on notably by Gallait and De Keyser; while the strong current of the present French influence may be seen in the works of the living artists Alfred Stevens and Verlat. In Italy after a long

period of artificialness and mediocrity there are signs of a revival in painting. Pio Joris and Cammarano have gained distinction as painters of history, and Alberto dall' Oro and Pallizzi as painters of landscape. Morbelli and Segantini show in their works some signs of a return to nature. Spain, too, with the exception of the works of Fortuny, remains unindividualistic; but a strong influence is now being exercised upon her by French art. Russian art remained at a standstill after the Byzantine period, but has since 1850 made great advances. It has produced Swedomsky, historical painter, Verestchagin, a traveler artist, and Kramskoë, a religious painter. Scandinavian art inclined for some time to the two schools of Düsseldorf and Paris, but has finally elected to follow the latter, several of her younger artists residing permanently there. Their choice is usually landscape, and among the chief names may be mentioned Normann Uhde and Edelfeldt. Until about 1825 the U. S. had followed Great Britain in art as in literature. Since that time, however, a marked development of individuality and excellence has been apparent, as is shown by the following statement. At the French exposition, the most famous and exclusive of art exhibitions, in 1855 there was no American section; in 1868 a part of a small section was allotted to the U. S.; in 1878 it had a large exhibit, and in 1900 it furnished the largest exhibit except France, and received more honors than any other nation except France. Most American painters complete their education abroad, particularly in France; but there are an increasing number of good art schools in the U. S., and with the excellent instruction offered in the public schools, they are rapidly cultivating an appreciation of the best in art. Of American painters the following are probably the best known: West, Copley, Stuart, Allston, Bierstadt, Church, Inness, La Farge, Sargent, Vedder, Whistler and Moran.

Paisley, a municipal and parliamentary burgh of Scotland, in the county of Renfrew, on the White Cart. The most noteworthy building is the Abbey Church. Others are the new county buildings, the old county buildings and prison, the townhall, the Neilson educational institution, etc. Paisley has been long noted for its manufactures of textile goods. The shawl manufacture, introduced about the beginning of the present century, and long a flourishing industry, is not now a staple, but the textile manufacture is still large, and to it has been added that of sewing cotton. Among the other manufactures are tapestry, embroidery, tartans, and carpets. There are also dye and print works, engineering works, soap works, manufactories of starch, corn flour, mustard, and chemicals; distilleries, breweries, and shipbuilding yards, chiefly for river steamers and dredgers.

Pal'adin, a term originally applied to the *Comes palatii*, Count of the Palace, or Count Palatine, the official who superintended the household of the Carlovingian sovereigns, and then to the companions in arms of Charlemagne, who belonged to his court. Latterly it was used in a more general sense.

Palæog'raphy (Gr. *palaios*, ancient, and *graphē*, writing), is the science by means of which ancient inscriptions, and the writings and figures on ancient monuments, are deciphered and explained; as distinguished from *diplomatics*, which deals with written documents.

Palæontol'ogy is the science which treats of the living beings, whether animal or vegetable, that have inhabited the globe in the successive periods of its past history. The comparison of the fossil remains of plants and animals, belonging for the most part to extinct species, has given a powerful impulse to the science of comparative anatomy, and through it a truer insight has been obtained into the natural arrangement and subdivision of the classes of animals. But the science which has profited in the highest degree from palæontology is geology. Palæontology, apart from its importance as treating of the past life history of the earth, assists the geologist in his determination of the chronological succession of the materials composing the earth's crust. *Palæozoic*, or ancient life epoch, which includes the Laurentian, Cambrian, Silurian, Devorian, Old Red Sandsone, Carboniferous, and Permian rock systems. *Mesozoic*, or middle life epoch, including the Triassic, Jurassic or Oolitic, and Cretaceous rock systems. *Cainozoic*, or recent life epoch, which comprises the Eocene, Miocene, Pliocene, and Post-tertiary rock systems. The fossil remains of the first two divisions mostly belong to extinct species. The Cainozoic fossils belong mostly to living species or species only recently extinct.

Palais Royal (pâ-lā-rwâ-âl), a popular resort of the Parisians, originally a royal palace as the name implies. The original palace was built (1629-36) by Richelieu, and by him presented to Louis XIII. It was confiscated by the Republicans in 1793, and the Tribunal sat in the palace during the Reign of Terror. At the Restoration it was repurchased by the Duke of Orleans, but in the revolution of 1848 it was again appropriated to the state. In 1871 it was set on fire by the Communists, but has since been restored. The Théâtre Français and several shops now form parts of the buildings of the Palais Royal.

Palanquin (Palankeen) (pal-an-kēn'), a covered conveyance used in India, China, etc., borne by poles on the shoulders of men, and in which a single person is carried from place to place. The palanquin proper is a sort of box about 8 ft. long, 4 ft. wide, and as much in height, with wooden shutters on the venetian-blind principle. It used to be a very common conveyance in India, especially among the Europeans, but the introduction of railways and the improvement of the roads have almost caused its discontinuance.

Pal'ate, the name applied to the roof of the mouth. It consists of two portions, the *hard* palate in front, the *soft* palate behind. The former is bounded above by the palatal bones, in front and at the sides by the alveolar arches

and gums being lined by mucous membrane; behind, it is continuous with the soft palate. It supports the tongue in eating, speaking, and swallowing. The *soft palate* is a movable fold suspended from the posterior border of the hard palate. It consists of mucous membranes, nerves and muscles, and forms a sort of partition between the mouth and hinder nostrils. Its upper border is attached to the posterior margin of the hard palate; its lower border is free. The *uvula* hangs from the middle of its lower border, and on each side are two curved folds of mucous membrane called the *arches* or *pillars* of the *soft* palate. Between these on either side of the pharynx are the two glandular bodies known as *tonsils*. The upper surface of the soft palate is convex, the lower surface is concave with a median ridge, the latter pointing to the early or embryo stage of its formation when it consists of two distinct parts. Non-union of these halves and of those of the hard palate constitutes the deformity known as *cleft palate*, often associated with hare-lip. Glands are abundant in the soft palate, secreting the mucus which lubricates the throat during the passage of food. The soft palate comes into action in swallowing, and in speaking, being of great importance in the utterance of certain sounds. The special use of the uvula is not well known. It is often relaxed or enlarged, causing troublesome cough.

Palat'inate (German Pfalz), a division of the old German Empire, under the rule of counts palatine (Pfalzgrafen), consisting of two separate portions distinguished as the Upper and Lower Palatinate. The Upper or Bavarian Palatinate was bounded mainly by Bohemia and Bavaria, and its capital was Amberg. The Lower or Rhenish Palatinate lay on both sides of the Rhine, surrounded by Baden, Alsace, Lorraine, etc., its chief towns being Heidelberg and Mannheim. The counts palatine were in possession of the Palatinate and the districts belonging to it as early as the eleventh century, and were long among the most powerful princes of the German Empire. At the Peace of Westphalia (1648) the Lower Palatinate was separated from the Upper, Bavaria getting the latter, while the former now became a separate electorate of the empire, and was henceforth generally known as *the* Palatinate. By the treaties of Paris (1814–15) the Palatinate was split up; Bavaria received the largest part, and the remainder was divided between Hesse-Darmstadt and Prussia. The name Palatinate now belongs to the detached portion of Bavaria on the west of the Rhine, while the Upper Palatinate forms another portion of the monarchy.

Palat'ka, a port and city of Florida, on the western bank of the St. John's River, 50 mi. from the sea. It is frequented by deep-sea as well as by river steamers, and has a trade in oranges, sugar, and cotton. Pop. 3,000.

Palawan', an island on the northeast of Borneo, belonging to the Philippines; area 4,576 sq. mi. It is mountainous, well wooded and watered, and very fertile, but unhealthy. Pop. 28,000.

Pale, in heraldry, the first and simplest kind of ordinary. It is bounded by two vertical lines at equal distances from the sides of the escutcheon, of which it encloses one third. See *Heraldry*.

Palembang', a town of Sumatra, capital of the province of the same name, on the Moosi, here called the Palembang. There are 25,000 inhabitants, partly inhabiting houses raised on posts, and partly living on rafts moored in the river.

Palenque (pä-len'kā), a village of Mexico, state of Chiapas, 60 mi. n.e. of Ciudad Real. About 7 mi. s.w. of it are some of the most extensive and magnificent ruins in America, belonging to the period anterior to the Spanish conquest. The principal of these, called the "palace," is 220 ft. long by 180 ft. wide, with numerous sculptures and hieroglyphics.

Paler'mo, a seaport town, the capital of Sicily, on the north side of the island. The city is ornamented by numerous fountains, and has many public edifices, including a cathedral of the tenth century. Other notable buildings are the churches of St. Peter and St. Dominic, a royal palace, the Cappella Palatina, the picture gallery and the armory; the National Museum, the archiepiscopal palace, the customhouse, the university, three theaters, and numerous others. Palermo is the residence of the military commandant of the island, and has an arsenal and shipbuilding yards. The manufactures consist chiefly of silks, cottons, oilcloth, leather, glass, and gloves. The principal exports are sumach, wine and spirits, fruits, sulphur, skins, oil, essences, cream of tartar, licorice, and manna; imports, colonial produce, woolen, cotton and silk tissues, hardware, earthenware, etc. The fisheries are very productive, and give employment to nearly 40,000 hands. Palermo was probably founded by the Phœnicians; it afterward became the capital of the Carthaginian possessions in Sicily. It was taken by the Romans 254 B.C. The Saracens held it for a time, and in 1072 it fell to the Normans. The German emperors and the French subsequently held it, and since the Sicilian Vespers (1282) it has shared the fortunes of the Sicilian kingdom. The court of Naples resided here from 1806 to 1815. Garibaldi captured the town in 1860. Pop. 204,712. The province of Palermo contains an area of 1,963 sq. mi. Pop. 791,928.

Pal'estine (Canaan or the Holy Land), a maritime country of Asiatic Turkey, in the southwest of Syria. Length, north to south, about 140 mi.; breadth, about 80 mi.; area, nearly 10,000 sq. mi. The coast has no indentations except the Bay of Acre in the north. The chief feature of the interior is the deep valley of the Jordan, a river which intersects the country from north to south, and connects three lakes, the Dead Sea, Lake of Gennesaret, and Lake Merom. The surface is generally mountainous. The most remarkable mountains are Carmel, Jebel, Tur (Tabor), Ebal, Gerizim, Zion, Moriah, and the Mount of Olives. The maritime or coast plains of

Sharon and Philistia, the river plain of Jordan, and the plain of Esdraelon in the north, are the plains worthy of mention. The principal river is the Jordan. This river has a length of 200 mi., including windings, but its direct course is only about 70. Its course from Merom to the Dead Sea is mostly below the sea level. The chief tributary of the Jordan is the Zerka or Jabbok. The most remarkable lake is the Dead Sea, 46 mi. long, 9 or 10 broad, and fully 1,300 ft. below the Mediterranean. In Palestine the wells and springs are numerous and are all counted worthy of note. Among the most interesting are the springs of hot water which issue forth on both sides of the Jordan valley. As regards geology the chief rock formation of the country on both sides of the Jordan is limestone, full of caves. Sandstone also occurs, with basalt and other volcanic rocks. Signs of volcanic action are abundant, and earthquakes are still common. The year may be divided into two seasons, summer and winter. During the former, which lasts from April to November, little or no rain falls; during the latter there is a considerable fall of rain. In the Jordan Valley and along the Mediterranean lowlands the summer heat is apt to be oppressive. During the winter the ground is seldom, if ever, frozen except in the higher elevations. Palestine was once very fertile. Among the products, besides the usual cereals, are grapes, figs, olives, oranges, and apricots. The flora of Palestine is rich in flowering plants, including the scarlet anemone, ranunculus, narcissus, crocus, pheasant's-eye, etc. The country is now, as a whole, bare and desolate, though forests of pine and oak exist. The most common tree is the oak, including the prickly evergreen oak and two deciduous species. Other trees are the olive, palm, oleander, sycamore, walnut, ash, cedar. The wild animals include the leopard, hyena, bear, wolf, jackal, boar, antelope, gazelle, porcupine, coney, jerboa, etc. The domestic animals of burden are the ass, mule, and camel. The cattle are not generally very numerous. Sheep and goats are abundant. Among the birds are eagles, vultures, hawks, ravens, bee-eaters, hoopoes, storks, and nightingales. Fish abound in the Sea of Galilee and the Jordan. The ancient name of the country was Canaan, and when thus named, in the time of the patriarchs, it was parceled out among a number of independent tribes, all probably Semitic. In the time of our Saviour Palestine was held by the Romans and divided into the four provinces of Galilee, Samaria, Judea, and Perea. In 606 Palestine was taken by the Saracens under Omar. The severities exercised toward Christians gave rise to the Crusades, but Mohammedanism prevailed. The sultan of Egypt ruled it till 1517 when it was incorporated with the Turkish Empire.

It is only within a comparatively recent period that the exploration of Palestine has been carried out systematically and with some attempt at thoroughness, though much yet remains to be done. The most valuable results have been those achieved under the direction of the "Palestine Exploration Fund," a society organized in 1865 for the purpose of making an exhaustive exploration and an exact survey of the Holy Land. In 1870 the American Palestine Exploration Society was organized, and it was agreed that the English society should confine itself to the western side of the Jordan, and the American society to the eastern. The triangulation of Western Palestine was begun in 1871 and finished in 1877. A large and detailed map of the country has been published and an immense mass of valuable information regarding topography, natural history, etc., accumulated. The present population of the country is estimated at 650,000, the Arab element being probably the prevailing one, and the Arabic language generally in use.

Palestine, Anderson co., Tex., 181 mi. n.e. of Austin. Railroad: Inter. & Great Northern. Industries: foundry, brick yards, cotton-seed oil mill and compress, saw and grist mills, etc. Exports include cotton, lumber, grapes, etc. Pop.1900, 8,297.

Palette, PAINTER'S, an oval tablet of wood, or other material, very thin and smooth, on which painters lay the various colors they intend to use, so as to have them ready for the pencil. In connection with the palette painters use a palette knife, a thin, round-pointed knife for mixing up colors. The palette is held by a hole at one end in which the thumb is inserted.

Pâli, the sacred language of the Buddhists, as closely related to Sanskrit as Italian to Latin. It is the language in which the oldest religious, philosophical, and historical literature of Buddhism is written, and is especially the language of the sacred books of the Buddhists of Ceylon, Burmah, and Siam; but it is no longer spoken anywhere, though a corrupt form of it is to some extent used for literary purposes. The study of Pâli was introduced into Europe by Lassen and Burnouf.

Palicourea (pā-li-kō'rē-a), a genus of plants, nat. order Rubiaceæ, tropical American shrubs, with small or rather large flowers in compound thyrses or corymbs.

Pal'impsest, a manuscript prepared by erasure for being written on again, especially a parchment so prepared by washing or scraping. This custom was brought about by the costliness of writing materials, and was practised both by the Greeks and Romans, and in the monasteries, especially from the seventh to the thirteenth centuries. That which replaced the ancient manuscripts was nearly always some writing of an ecclesiastical character. The parchments which have been scraped are nearly indecipherable. Those which have been washed have often been revived by chemical processes. Fragments of the *Iliad* and extensive portions of many Greek and Roman writers have been recovered by these means.

Palissy, BERNARD (1510–1590), a French artist and philosopher. After sixteen years of unremunerated labor (1538–54), he obtained a pure white enamel, affording a perfect ground for the application of decorative art. He was then able to produce works in which he repre-

sented natural objects grouped and portrayed with consummate skill, and his enameled pottery and sculptures in clay became recognized as works of art. In 1562 he went to establish himself at Paris, where he continued to work at his art, and also delivered scientific lectures, which were attended by the most distinguished men in Paris, and contained views far ahead of his time. He suffered persecution as a Huguenot, and was arrested in 1589 and thrown into the Bastile, where he is said to have died.

Palissy Ware, a peculiar kind of French art pottery invented by Bernard Palissy. The surface is covered with a jasper-like, white enamel, upon which animals, insects, and plants are represented in their natural forms and colors. Specimens of this ware are much valued and sought after by collectors.

Palladian Architecture, a species of Italian architecture due to Palladio, founded upon the Roman antique as interpreted by the writings of Vitruvius, but rather upon the secular buildings of the Romans than upon their temples. It is consequently more applicable to palaces and civic buildings than to churches. A characteristic feature of the style is the use of engaged columns in façades, a single row of these often running through the two principal stories.

Palla'dio, Andrea (1518–1580), one of the greatest classical architects of modern Italy, was b. at Vicenza. He perfected his architectural acquirements at Rome, and on his return to Vicenza he established his fame by his designs for many noble buildings both there and in other parts of Italy. From 1560 he erected many buildings at Venice. He was the author of a *Treatise on Architecture.*

Palla'dium, a wooden image of Minerva which is said to have fallen from heaven, and to have been preserved in Troy. The Trojans believed that their city would be invincible so long as it contained the Palladium. The Romans pretended that it was brought to Italy by Æneas, and preserved in the temple of Vesta at Rome, but several Greek cities claimed to possess it.

Palla'dium, a metal discovered by Wollaston in 1803, and found in small quantity associated with native gold and platinum. It presents a great general resemblance to platinum, but is harder, lighter, and more easily oxidized. It is useful on account of its hardness, lightness, and resistance to tarnish, in the construction of philosophical instruments.

Pallas, of the minor planets revolving round the sun between Mars and Jupiter, that whose orbit is most inclined to the ecliptic. It was discovered in 1802 by Olbers at Bremen. It revolves round the sun in 4.61 yrs; diameter 172 mi.

Pallas Athēnē, the Greek goddess of wisdom, subsequently identified with the Roman Minerva.

Palma, an episcopal city of Spain, capital of the island of Majorca, 130 mi. s. of Barcelona. It is built in the form of an amphitheater, and enjoys an extremely mild and salubrious climate. The principal public buildings are the cathedral, the exchange, the governor's palace, and the townhouse. There are schools of medicine and surgery, normal and nautical schools, two public libraries, and a museum. Shipbuilding yards employ numerous hands. Palma is the port of the whole island, and has an important trade. Pop. 59,493.

Palma, Tomas Estrada (1835——), a Cuban general and patriot; b. in Bayamo, in 1835. He soon became an ardent advocate of Cuban independence and joined the revolution of 1868, thereby losing his estate. In 1895 he was chosen as the foreign representative of the Cubans, and came to reside in New York. On Dec. 31, 1901, he was elected president of the Cuban Republic.

Palmer, Alice Freeman, b. Broome co., N. Y., in 1855. She was graduated from the University of Michigan in 1876 and became instructor at Geneva Lake, Wis. In 1879 she was appointed professor of history in Wellesley College, and in 1882 became president of that institution. She was married to Prof. George H. Palmer of Harvard in 1887. She was a member of the faculty of the University of Chicago from 1892 to 1895. Died Dec. 6, 1902.

Palmer, John M., b. in Scott co., Ky., in 1817. He was admitted to the bar of Illinois in 1840 and served in the state senate, and in 1860 was a member of the Electoral College as a Republican. He took an active part in the Civil War and became major general of volunteers. He was governor of Illinois from 1869 to 1873, and was elected U. S. Senator from Illinois in 1891 as a Democrat. In 1896 he became presidential candidate of the "Gold Democrats." Died Sept. 25, 1900.

Palmer, Thomas W., b. in Detroit, Mich., in 1830. He was graduated from the University of Michigan and engaged in the real estate and lumber trade. He was a member of the state senate in 1878, and in 1883 was elected U. S. Senator from Michigan. Afterward he was appointed minister to Spain. In 1890 he was elected president of the National Commission which had charge of the World's Columbian Exposition in 1893.

Palmer, Hampden co., Mass., on Quaboag River, 15 mi. e. of Springfield. Railroads: Boston & Albany; New London Northern; Ware River. Industries: cotton mills, iron foundry, woolen mills, wire mill, and carpet factory. Surrounding country agricultural. Pop. 1900, 7,801.

Palmerston (pä'mer-stun), Henry John Temple, Viscount (1784–1865), English statesman, was b. in Westminster. In 1807 he was returned to Parliament as member for Newport, Isle of Wight, and became junior lord of the admiralty in the Duke of Portland's administration. In 1809 he became secretary of war, and two years later he was elected member for Cambridge University. He was a supporter of Catholic emancipation, and retired from office in the Wellington ministry in 1828 with others of the Canning party. In 1831 he was returned for Bletchingly, and after the Reform bill (1832) for South Hants.

He continued in office as foreign secretary until 1841. It was during this period that he gained his great reputation for vigilance and energy in the conduct of foreign affairs. In February, 1852, he became home secretary in the coalition ministry of Lord Aberdeen. On the resignation of his ministry he became prime minister, which position he held, with a brief interruption, for the remainder of his life.

Palmetto Palm, a common name of several palms, especially the cabbage palm, which grows in the West Indies and in the Southern states. It attains the height of 40 or 50 ft. and is crowned with a tuft of large leaves. It produces useful timber, and the leaves are made into hats, mats, etc.

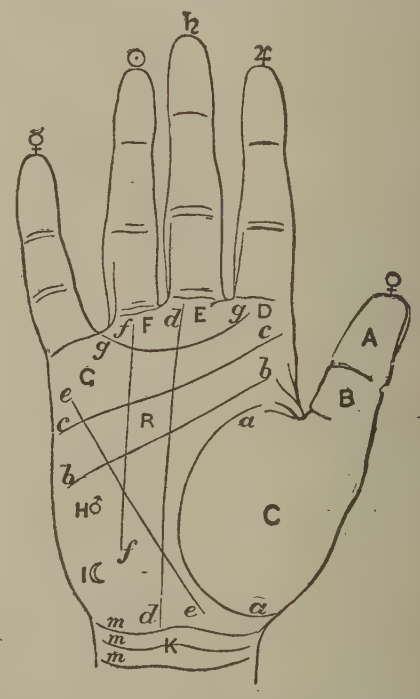
Palmistry (or Chiromancy) (Gr. *cheir* "the hand," and *mantikē*, "divination"), is the art of "reading the palm"—the art which professes to discover the temperament and character of any one, as well as the past and future events of his life, from an examination of the *palm* of his hand, and of the lines traced upon it. As a considerable body of very complicated rules and directions have been laid down by authorities, ancient and modern, to enable the student to read the palm, palmistry claims to be regarded as a "science," or at least as a branch of an interpretative science of the hand in general, to which the name *Chirosophy* has been given. The other branch of this general science has been called *Chirognomy*, and is concerned with the interpretation of the form and character of the hand and fingers, while Chiromancy treats of the palm only.

As an art palmistry appears to be of great antiquity. There is a caste of Brahmans, called Joshi, who profess the art of fortune-telling by means of marks on the palms of the hands, the face, and the body generally; and who seem to have practised it from remote times. Palmistry has an ancient literature of its own in India; the ancient Samudriki appears to have had some acquaintance with letters, but the Joshi, his modern representative, is quite illiterate, though he generally carries about with him a manual of palmistry, of whose contents he knows nothing. There are also a number of wandering outcasts in India who tell fortunes by palmistry.

That palmistry was to some extent at least known to the ancient Greeks we have evidence in the writings of the Stagirite himself. In his *Historia Animalium* Aristotle observes that long-lived persons have one or two lines which extend through the whole hand; short-lived persons have two lines not extending through the whole hand. Other references to this subject occur in the doubtful works, the *Problemata* and the *Physiognomika*, attributed to him. Pliny, too, in his *Natural History*, directly asserts that Aristotle regarded numerous broken lines in the palm of the hand as a prognostic of short life.

Of the cultivation of palmistry among the Romans there is little evidence; but Juvenal, in showing up the curiosity of women and their love of prying into forbidden mysteries, describes the woman of fashion as consulting eagerly Chaldean astrologers and other diviners. In the second century Artemidorus of Ephesus, the author of a work on the interpretation of dreams, is said to have devoted a whole treatise to the subject, which, however, is not extant.

In the writers of the Middle Ages there is much reference to the subject, and the names of Parcelsus, Albertus Magnus, and Cardanus have been associated with it. But the most important work on chiromancy belonging to this period seems to be *Die Kunst Ciromantia*, of Johann Hartlieb, which was printed at Augsburg in 1475. In the sixteenth century we find several treatises on the subject, of which the most important seem to be



A.—will; B.—logic; C.—mount of Venus; D.—mount of Jupiter; E.—mount of Saturn; F.—mount of Apollo; G.—mount of Mercury; H.—mount of Mars; I.—mount of the Moon; K.—the rascette; *a, a.*—line of life; *b, b.*—line of head; *c, c.*—line of heart; *d, d.*—line of Saturn or fate; *e, e.*—line of liver or health; *f, f.*—line of Apollo or fortune; *g, g.*—the girdle of Venus; R—the quadrangle; *m, m, m.*—bracelets of life.

those of Johann, Indagine, and of Barthelemy Cocles "de Bouloigne," doctor of natural philosophy and of medicine. In the end of the eighteenth century palmistry found an important exponent in the celebrated Marie Anne Lenormand (1772–1843), who in her *Souvenirs Prophétiques d'une Sibylle* (1814) foretold the downfall of Napoleon. The chief authorities on palmistry in recent times are two Frenchmen—M. le Capitaine D'Arpentigny, and M. Adrien Desbarrolles; and it is on their works that modern English books on the subject are chiefly founded. D'Arpentigny has expounded principally chirognomy, or that

branch of the interpretative science of the hand which treats of the general form of the hand and fingers. The observation of the fingers and joints of the hand is quite as important to the chiromant as that of the palm itself; but we must refer for D'Arpentigny's system to the works cited below. The thumb is generally regarded as chirognomically the most important part of the hand. The first, or upper phalange of the thumb, when well developed, shows the presence of will and decision of character; the second, according to its development, indicates more or less logical power (see A and B in diagram). What has to be considered by the chiromant proper is the "mounts" of the hand, with the marks on them, and the lines in the palm. The "mounts" are the elevations at the base of the fingers and thumb and in the "percussion" of the hand, i. e., the side of the palm which extends from the root of the little finger to the wrist; it is so called because it is used in striking. They are seven in number, and are named from the planets, by the signs of which they are also known—viz., ♀ for Venus, ♃ for Jupiter, ♄ for Saturn, ☉ Apollo, ☿ Mercury, ♂ Mars, ☾ the Moon (see diagram). When well developed the mounts indicate the possession of the quality associated with the respective planets—e.g., Jupiter developed denotes pride and ambition; Saturn, fatality; Apollo, art or riches; Mercury, science or wit; Mars, courage or cruelty; Venus, love and melody; the Moon, folly or imagination. But the effect of a greatly developed mount may be modified by the lines in the palm or by other signs.

There are four principal lines—viz., the line of life, which surrounds the thumb, and which, if long, indicates a long life; the line of head, the line of heart, and the rascette or the brace lets. These last (the bracelets), if well marked strengthen the effect of the line of life, each bracelet indicating thirty years of life. The line of heart (the *linea mensalis* of ancient chiromancy), if long, clear cut, and well colored, denotes an affectionate and devoted character; and the nearer the line stretches to Jupiter the better the character. If the line end in a fork, so much the better. In actors and mimics this line ascends the mount of Mercury. A good line of head—i.e., a clear-cut, long, unbroken line—indicates the presence of superior intellectual qualities. If the line stretch to the mount of the Moon, it indicates imagination. A winding headline shows folly and indecision of character; a linked line (like a chain) denotes want of concentration. The other lines (which are not present in all hands) are the line of Saturn or fate (*d*, *d*), the line of Apollo (*f*, *f*), the line of liver or health (*e*, *e*), and the line of Venus (*g*, *g*). A long, clear-cut line of Saturn (see diagram) foretells a happy and prosperous life, breaks or windings in the line foretell misfortunes or obstacles; a good line of Apollo shows that its owner will be successful in art; a good liver-line promises a long and healthy life; while the Venus line (*Cingulum Veneris*), when present, indicates a character very liable to be influenced by the passion of love. Marks on the mounts or lines, such as stars, crosses, etc., have their respective significations. A good open space between the lines of head and heart (the quadrangle) indicates a generous and noble disposition, while a very narrow space in the quadrangle is a sign of avarice and egotism.

Palm Oil, a fatty substance obtained from several species of palms, but chiefly from the fruit of the oil palm, a native of the west coast of Africa. This tree grows to the height of 30 ft., bears a tuft of large pinnate leaves, and has a thick stem covered with the stumps of the stalks of dead leaves. The fruits, which are borne in dense clusters, are about 1½ in. long by 1 in. in diameter, and the oil is obtained from their fleshy covering. In cold countries it acquires the consistence of butter, and is of an orange-yellow color. It is employed in the manufacture of soap and candles, for lubricating machinery, wheels of railway carriages, etc. By the natives of the Gold Coast this oil is used as butter; and when eaten fresh is a wholesome and delicate article of diet.

Palms, the Palmaceæ, a nat. order of arborescent endogens, chiefly inhabiting the tropics, distinguished by their fleshy, colorless, six-parted flowers, enclosed within spathes; their minute embryo lying in the midst of albumen, and remote from the hilum; and their rigid, plaited, or pinnated leaves, sometimes called fronds. The palms are among the most interesting plants in the vegetable kingdom, from their beauty, variety, and associations, as well as from their great value to mankind. While some have trunks as slender as the reed, or longer than the longest cable, others have stems 3 and even 5 ft. thick; while some are of low growth, others exhibit a stem towering from 160 to 190 ft. high, as the wax palm of South America. About 600 species are known, but it is probable that many are still undescribed. Wine, oil, wax, flour, sugar, sago, etc., are the produce of palms; to which may be added thread, utensils, weapons, and materials for building houses, boats, etc. There is scarcely a single species in which some useful property is not found. The cocoanut, the date, and others are valued for their fruit; the cabbage palm, for its edible terminal buds; the fan palm, and many more, are valued for their foliage, whose hardness and durability render it an excellent material for thatching; the sweet juice of the Palmyra and others, when fermented, yields wine; the center of the sago palm abounds in nutritive starch; the trunk of the wax palm exudes a valuable wax; oil is expressed in abundance from the oil palm; many of the species contain so hard a kind of fibrous matter that it is used instead of needles, or so tough that it is manufactured into cordage; and, finally, their trunks are in some cases valued for their strength, and used as timber, or for their elasticity or flexibility.

Palmy'ra, an ancient city of Syria, now in ruins, situated in oasis 140 mi. e.n.e. of Damascus. It was founded or enlarged by Solomon in the tenth century B. C. In 1400 Tamerlane completely destroyed it. There

are remains of ancient buildings, chiefly of the Corinthian order, with the exception of the Temple of the Sun, which is Ionic.

Palmy'ra Palm, the common Indian palm, a tree ranging from the northeastern parts of Arabia through India to the Bay of Bengal. In India and other parts of Asia it forms the chief support of 6,000,000 or 7,000,000 of population. Its fruit is a valuable food, its timber is excellent, and it furnishes thatch, cordage, and material for hats, fans, umbrellas, etc. It produces sugar and arrack, and its leaves are used for writing tablets. The young shoots are boiled and eaten, the seeds are edible, and the fruit yields a useful oil. A full-grown palmyra is from 60 to 70 ft. high, and its leaves are very large. The name palmyra-wood is frequently given to other woods of a similar nature.

Palpitation consists of repeated attacks of violent and spasmodic action of the heart. When palpitation arises from organic lesion of the heart it is called *symptomatic,* when it is caused by other disorders disturbing the heart's action it is called *functional.* Disorders which may cause palpitation include nervous affections, anæmia, chlorosis, protracted mental emotion, excessive use of stimulants, etc.

Paludan-Müller, FRIEDERIK (1809–1871), the chief recent poet of Denmark, educated at Copenhagen University. He began his career as a poet in 1832. His works include *Adam Homo,* a humorous didactic poem; *Kalanus,* an Indian tragedy; *Adonis,* a poetic romance; *Amor and Psyche,* a lyrical drama, etc.

Pamir (pä'mēr), an elevated region of Central Asia, that may be regarded as formed by the meeting of the Himalayan and Thian Shan mountain systems. It forms a plateau having a general elevation of more than 13,000 ft., dominated by still loftier ridges and summits clothed with eternal snow. There are several small lakes here, and the sources of the Oxus take their rise in the Pamir. The atmosphere is exceedingly dry, the extremes of heat and cold are very great, and great part of the surface is bare and barren. The Kirghiz, however, find a certain amount of pasture for their cattle in summer, and in favored localities there is a little cultivation. The Pamir, or "roof of the world," is celebrated throughout Central Asia, and trade routes have passed across it for ages.

Pam'lico Sound, a shallow lagoon on the southeast coast of North Carolina. It is 80 mi. long, from 8 to 30 mi. wide, and separated from the ocean by long, narrow, sandy islands.

Pampas, a name given to the vast treeless plains of South America in the Argentine Republic, Paraguay, and Uruguay. The pampas are generally covered with grass and other herbage, and in many parts with gigantic thistles, but with the heat of summer the vegetation is much burned up. Shallow lakes or swamps occur in some parts, and parts have the character of a salt steppe. The pampas are roamed over by various tribes of Indians, as well as by herds of wild horses and cattle. In many parts there are now cattle ranches, and large flocks of sheep are also reared.

Pamphyl'ia, an ancient province of Asia Minor, extending along the Mediterranean from Cilicia on the east to Lycia on the west. It was mountainous, being covered with the ramifications of the Taurus Mountains. Pamphylia never attained any political importance. It was subject successively to Persia, Macedonia, Syria, and Rome, although some Greek colonies for a time maintained their independence.

Pan, a rural divinity of ancient Greece, the god of flocks and herds, represented as old, with two horns, pointed ears, a goat's beard, goat's tail, and goat's feet. The worship of Pan was well established, particularly in Arcadia. Pan invented the syrinx or *pandean* pipes.

Pana, Christian co., Ill., 42 mi. s.e. of Springfield. Railroads: C. C. C. & St. L.; Illinois Central; and Ohio & Mississippi. Pop. 1900, 5,530.

Panama, REPUBLIC OF, an independent state of South America, whose territory is co-extensive with that of the Isthmus of Panama. Its extension from east to west is about 460 miles, and its breadth varies from 70 to 31 miles, where the isthmus is narrowest, between the cities of Colon and Panama. This is the narrow neck of land traversed by the Panama Railway and across which the Panama Canal is now under construction. The surface is generally uneven and rocky. The Pacific coast is high and broken, but that along the Caribbean is low and more even. The country has a tropical climate and heavy rainfall. The region is generally unhealthful to all except native people. The population is made up of mixed races, of Spanish, Indian and negro origin, and contains but few white men. A few of the native tribes still remain, and in the western portion of the country have maintained their original organizations and language. The leading industries are grazing and agriculture, and on the Pacific coast pearl fishing. The only important cities are Panama and Colon. Panama is the capital and the Pacific terminus of the railway. It is a city of 25,000 and is the center of finance and influence for the republic. Colon is the Atlantic terminus of the railway, has a population of about 3,000 and has attained some importance from its relations to the operations on the Panama Canal.

The first European settlement on the American continent was made at Darien, and since 1535 the isthmus has been considered of unusual importance on account of the transit of passengers and merchandise from ocean to ocean. In 1718 Panama was incorporated as a department of the Republic of New Granada. In 1859 this union was dissolved and the State continued as an independent government until 1861, when it returned to its former political dependence. Its relations to the government of Colombia have been political only. In 1846 the United States ratified a treaty with New Granada by which it guaranteed the neutrality

of the isthmus and free transit over the Panama Railroad. Since that date American interference has been necessary a number of times in order to maintain the integrity of the railroad and the isthmus. On account of its geographical position the Republic of Panama is of great strategic importance, and when in August, 1903, the United States of Colombia rejected the treaty providing for the construction of the Panama Canal by the United States, the inhabitants of Panama felt that their interests were imperiled to such an extent as to warrant their withdrawal from the government and the establishment of an independent state. Accordingly measures to this end were immediately taken. The treaty between the United States and Colombia was such as to favor any movement toward independence that Panama might take, for while this treaty did not admit of interference on the part of the United States for the purpose of

the Republic of Panama was officially recognized and the United States of Colombia was informed of this fact. Within three days the revolution was complete and a temporary government was organized. Phillipe Bunau-Varilla was appointed by the Panama Junta diplomatic agent to the United States, where he was officially received November 12th. An election was held on December 27th, at which officers of the government and members to a constitutional convention were chosen. This convention met on January 20, 1904, and adopted a constitution based on that of the United States. The election under this constitution occurred on February 20th and the government was immediately organized on a permanent basis.

As soon as France and Great Britain were assured that the Republic of Panama would assume the obligations of the Colombian government towards the Panama Canal Company

quelling a rebellion or repelling an invasion, provided neither interfered with the Panama Railroad, yet the position of that railroad is such that invasion or rebellion were sure to effect it and the maintenance of transit which the United States is required to secure would necessarily lead that government to prevent any extensive military operations within the territory. On November 2, 1903, the municipality of the city of Panama held a meeting and passed an ordinance of secession for the state of Panama and for the establishment of an independent government which should be republican in form. The United States immediately sent warships and marines to the ports of Colon and Panama and refused to allow Colombian troops to land at any ports on the isthmus. As soon as the United States was officially informed by the American Consul at Panama that a de facto government existed, and certain financial obligations due from Colombia to the citizens of these respective countries, they followed the United States in recognizing the new republic. Other European governments soon followed the lead of France and Great Britain, so that the position of the republic among the nations was early assured. The United States of Colombia very naturally entered strenuous objections to the recognition of Panama by the United States and by the governments of Europe. But these were wholly ineffective and the movement was completed without serious diplomatic entanglements and entirely without bloodshed.

On November 16th a treaty was signed between Bunau-Varilla for the Republic of Panama and Secretary of State John Hay for the United States, providing for the construction of an isthmian canal. This treaty was ratified by the Panama Junta on the second of Decem-

ber, but when presented to the United States Senate it met vigorous objection on the part of the Senators who favored the Nicaragua Canal, and others who were opposed to the Administration. This objection succeeded in delaying the treaty until February 24, 1904, when it was ratified by a vote of 66 in favor to 17 against. The five articles of the treaty deal exclusively with the question of sovereignty and are as follows:

Article I. The United States guarantees and agrees to maintain the independence of the Republic of Panama.

Article II. The Republic of Panama cedes to the United States five miles on each side of the canal and three marine leagues at each terminal and also any other lands necessary to the construction or maintenance of the canal and its auxiliaries.

Article III. The Republic of Panama cedes to the United States the right to exercise the same power and authority over such lands "as if it were sovereign" and to the exclusion of such power by Panama.

Article IV. The Republic of Panama grants to the United States the use of all the rivers, streams and waters for navigation or so far as is necessary to the construction of the canal and its auxiliaries, including purposes of sanitation.

Article V. The Republic of Panama grants to the United States in perpetuity a monopoly of any system of communication across its territory by canal or by railroad. See *Panama Canal.*

Panama Canal, a canal to extend across the Isthmus of Panama from Colon on the Caribbean coast to Panama on the Pacific.

Early History.—The question of an isthmian canal is more than three centuries old. The first desire for such a canal was aroused by the Spanish conquest of Peru and Chili. At that time Ferdinand, King of Spain, proposed to cut a canal through the Isthmus of Panama so as to secure easy access to his new possessions, and his successor, Philip, thought favorably of a route across Nicaragua, but on account of European complications nothing was done with either project.

In 1665 Great Britain became interested in the Nicaraguan route and for the next quarter of a century attempted to gain control of it. The explorer Von Humboldt, who visited Central America early in the nineteenth century, saw the advantage and necessity of such a canal and expressed his belief that sometime it would be constructed by the United States.

The United States government first became interested in the isthmian canal project in 1825, when its representative to Nicaragua secured concessions for the construction of such a canal, and the following year Henry Clay, who was Secretary of State, ordered an examination of the route, but the matter was dropped soon after. Three years later, the King of Holland obtained a franchise for the construction of the canal, but this plan was annulled the following year and nothing further of importance was done until 1847, when Great Britain obtained control of the proposed route. Great Britain's claim was disputed by the governments of Nicaragua and the United States, and nothing further was done until 1849, when Cornelius Vanderbilt formed a company which secured concessions from Nicaragua for the construction of a canal. In the meantime the discovery of gold in California increased the demand for such a waterway, and the Vanderbilt company began operations. After spending some two millions of dollars, however, they found that the project was beyond their ability and attempted to secure the aid of the United States government. This aid was refused and the project fell through.

In 1846 the United States entered into a treaty with New Granada, in which our government agreed to insure the neutrality of the Isthmus of Panama for the transit of passengers and merchandise and to defend such neutrality against all aggressors. The completion of the Panama railroad soon after rendered this compact of international importance. In 1850 the Clayton-Bulwer treaty was ratified with Great Britain. This treaty provided that neither the United States nor Great Britain should exercise absolute control over any isthmian canal that might be constructed. Although the treaty was not satisfactory to the United States, it remained in force, with few violations on the part of either of the high contracting parties, until it was superseded by the Hay-Pauncefote treaty of 1901. By the terms of this treaty the Clayton-Bulwer treaty was abrogated and the privilege of the United States to construct, regulate and manage an isthmian canal was recognized. The same rules for navigating this canal as now control the navigation of the Suez Canal were adopted; that is, it is to be free and open to vessels of all nations, either of commerce or war, and is never to be blockaded, nor shall any act of war ever be exercised or permitted within it.

Panama Canal.—The history of the Panama Canal properly dates from 1878, though some years previous to this George M. Totten, chief engineer of the Panama railroad, made a tentative survey for a canal, following the line of the railroad, and showed the feasibility of its construction, estimating the cost from $60,000,000 to $150,000,000. His report was followed by a government survey under the direction of Commander E. P. Lull of the United States Navy. This survey resulted in locating the canal practically on the present route. In 1878 a concession was given Lieutenant Weyse and others by the government of Colombia to construct and maintain a canal across the isthmus. In the year following a congress of engineers was called at Paris under the direction of Ferdinand De Lesseps. This congress consisted of 135 delegates, most of whom were engineers, and eleven of them were from the United States. After a thorough discussion of the various routes proposed, the congress decided unanimously that the Panama route was the most desirable and it was selected. Immediately after the adjournment of the con-

gress the Interoceanic Shipcanal Company was organized and De Lesseps, under whose direction the Suez Canal had been constructed, was made president. This company proposed to cut a sea level canal 29½ feet deep, from 72 to 78 feet wide at the bottom and from 92 to 164 feet wide at the surface. The length of the canal including harbors was to be 46.09 miles, and 43.02 miles without the harbors. De Lesseps estimated that the cost would be $127,000,000, which was considerably less than the estimate made by the congress. At the close of 1888 this company had expended $200,000,000 and had not completed one-third of the work. Being pressed for funds, the company resorted to bribery as a means of securing additional aid and their operations grew into the most noted financial scandal in French history. The company was finally declared bankrupt by the government and a receiver was appointed.

The receiver was authorized to organize a new company and to proceed with the construction of the canal. On account of legal difficulties, pending the settling of the affairs of the old company, the new organization was not formed until 1894. This company, known as the Panama Canal Company, was capitalized at $13,000,000, and stock to the amount of $1,000,000 was given to the United States of Colombia. The company abandoned the sea level project and substituted a series of locks in place of it, as this would greatly reduce the expense of construction. During the next few years a little work was done and about $8,000,000 had been expended when the company again ceased operations.

In the meantime, several events had transpired to keep alive the interest in the Nicaragua route, and in 1895 the Congress of the United States authorized the appointment of a commission to investigate thoroughly its advantages. At that time it seemed that there was no possibility of the completion of the Panama Canal by the French company. This commission, generally known as the Ludlow Commission, made a tentative survey of the Nicaragua route and reported to Congress. In 1899 President McKinley was authorized to appoint a larger commission, with powers to make a more thorough and complete investigation. This is generally known as the Walker Commission, from its chairman, Rear Admiral John G. Walker of the United States Navy. Admiral Walker was assisted by a number of the most eminent engineers of the country, and after a very thorough investigation, the commission reported in favor of the construction of a canal by the Nicaragua route, stating that the principal reason for this report was the financial difficulty involved in purchasing the right of way from the Panama Canal Company, who wanted $102,400,000 for their franchises and property, while the estimate of the commission on the value of these assets was $40,000,000.

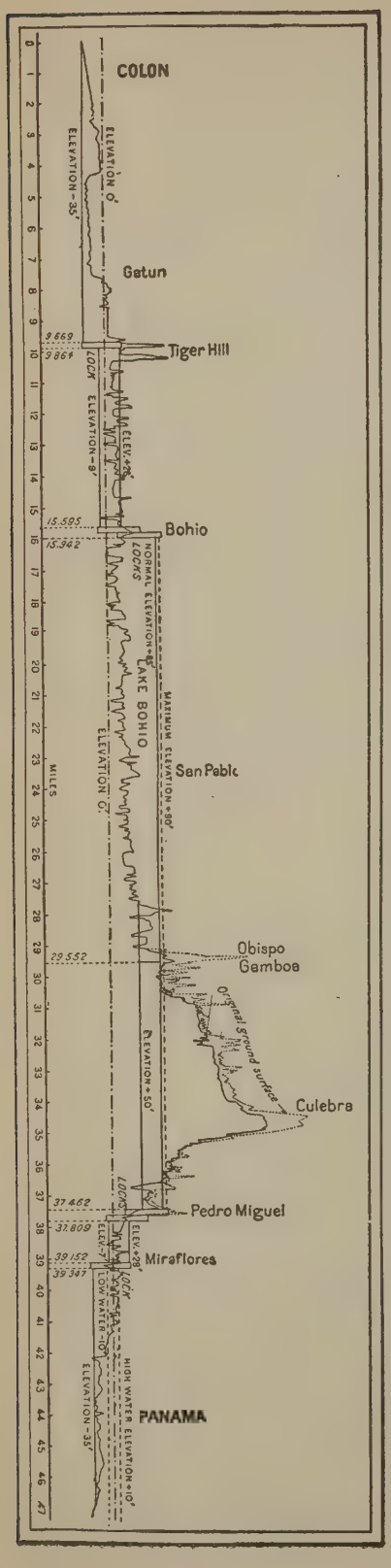
Immediately after this report was rendered to Congress, the French company offered to sell to the United States their entire claims, including franchises, machinery, right of way and the Panama railway, for $40,000,000, the value placed upon them by the commission. Following this offer the commission made a supplemental report recommending the purchase of the property and the adoption of the Panama route. In the meanwhile the House of Representatives had passed a bill authorizing the construction of the canal by the Nicaragua route, but this bill was rejected by the Senate in view of the supplementary report of the commission, and in place of it the Senate passed the Spooner Act, which authorized the President to purchase of the Panama Canal Company all their assets pertaining to the canal, for the sum of $40,000,000, providing a valid title to the property could be secured and a satisfactory treaty for the construction and control of the canal could be ratified with the United States of Colombia. This measure was accepted by the House and became a law in June, 1902.

In pursuance of the provisions of this act, a treaty was negotiated between Honorable John Hay, Secretary of State of the United States, and Dr. Herran, Minister Plenipotentiary from Colombia, and presented to the Senate of the Fifty-seventh Congress, in January, 1903. The treaty provided for the construction and control of the canal by the United States and the payment to the United States of Colombia of $10,000,000 in gold for the concessions granted, and an annuity of $250,000 a year after nine years following the ratification of the treaty. The treaty met with strong opposition from a few senators, who, under the lead of Senator Morgan, were strongly in favor of the Nicaragua route, and on this account its ratification was delayed until after the adjournment of the Fifty-seventh Congress. However, at an extra session called immediately by the President, it was ratified on March 18, 1903, and sent to the Colombian government. After several months of delay, during which the treaty was the subject of several stormy debates in the Colombian Senate, it was rejected by that body before its final adjournment in August. This rejection led to the immediate withdrawal of the senators from the State of Panama, and ultimately to the secession of that state. (See *Panama, Republic of.*)

Immediately after the organization of the government of Panama, they had sent to the United States Senate a treaty providing for the construction of the canal on nearly the same terms as were embodied in the treaty with the United States of Colombia. The account of the adoption of this treaty is found in the article on *Panama, Republic of.* It contains the following provisions in regard to the canal:

(1) The Republic of Panama agrees to secure for the United States the lands and rights that are required in the towns of Panama and Colon to effect the improvements provided for in the treaty, and authorizes the United States to impose and collect equitable water rates during fifty years. At the end of that time the use of the water shall be free for the in-

Panama Canal



habitants of Panama and Colon, except so far as may be necessary for the operation and maintenance of the water system and auxiliaries.

(2) That the Republic of Panama shall not pay more for official dispatches over the telegraph and telephone lines to be constructed than those required from officials of the United States.

(3) That the Republic of Panama shall permit immigration and free access to the lands and workshops of the canal and its auxiliaries to all employes of whatever nationality, provided they are under contract for work in any way connected with the canal.

(4) That such persons with their families shall be exempt from military service of the Republic of Panama.

(5) That the United States may import into the canal zone free of duty any materials convenient in the construction, maintenance and operation of the canal and auxiliary works, and all provisions, medicines, clothing and supplies for use of all persons in the employ of the United States, and for their families.

(6) That the canal when completed shall be neutral in perpetuity, and shall be opened on the terms provided for by Section I of Article III of the Hay-Pauncefote treaty of November 18, 1901.

(7) That the Republic of Panama shall have the right to transport over the canal its vessels, troops and munitions of war at all times free of charge.

(8) That the Republic of Panama agrees if it should become necessary at any time to employ armed forces to protect the canal or the ships using the same or the railways and auxiliary works, to provide the necessary forces for such purposes, and that if it cannot effectively handle the situation, the Panama government will allow the United States to employ whatever force may be necessary for that sole purpose, the said force to be withdrawn when the necessity for its presence has ceased.

(10) That when the circumstances demand, the United States may send forces to the isthmus without the advice or consent of the Panama government.

(11) That no change either in the government or laws and treaties of the Republic of Panama shall, without the consent of the United States, affect in any way the provisions of this treaty.

Early in March, 1904, President Roosevelt appointed the following canal commission: Rear Admiral John G. Walker, of the United States navy; Major-General George W. Davis, of the United States army; William Barclay Parsons, of New York; William H. Burr, New York; Benjamin M. Harrod, of Louisiana; Carl Ewald Grunsky, of California; and Frank J. Hecker, of Michigan. This commission met in Washington March 22nd and organized. By appointment Admiral Walker was made chairman and the commission immediately began preparations for sailing to the scene of its labors. By the 29th of March it was on the way and immediately began active operations. The first work necessary is that of sanitation, which it is thought will require about one year to complete. Following the completion of this, the construction of the canal will be pushed as rapidly as possible. On May 4, 1904, the commission took formal possession of the canal property, and the payment of the $40,000,000 was promptly made the French company. Thus was closed a question which, for more than half a century, has been an element of uncertainty in the international affairs of both Europe and America. The controversy between the parties favoring respectively the Nicaragua and Panama routes renders the following comparison as to their merits of consid-

erable interest. It is taken from the report of the first Walker Commission.

	Panama.	*Nicaragua.*
Total length, ocean to ocean, miles	46.09	183.66
Length between terminal harbors	43.02	180.59
Length of canal sections	36.41	73.78
Sailing in lakes (Bohio or Nicaragua)	12.68	70.51
Total excavation needed, cubic yards	90,000,000	185,000,000
Estimated total cost to complete	$144,000,000	$190,000,000
Annual cost of maintenance, estimated	$2,000,000	$3,300,000
Summit level above sea, feet	85	110
Water supply for summit level	Ample	Ample
Regulation of water supply	Automatic	Manipulated
Number of locks	5	8
Great dams, proportional size.	4	3
Height of deep cuts, feet	110	297
Total length of curves, miles	22.85	49.29
Total curvature, degrees	771	2.339
Shortest curve, feet radius	6,234	4,045
Number of curves under 5,000 feet radius	.....	10
Number of curves under 6,000 feet radius	.....	33
Number of curves under 7,000 feet radius	3	39
Number of curves under 8,000 feet radius	3	42
Total number of curves	28	56
Harbors to be constructed, number	.....	2
Railroad to be built, miles	.....	12
Could canal be made sea level?	Yes	No
Estimated time of passage, hours	12	33
Ships go through in daylight	Yes	No
Proportional danger of delays.	1	10
Healthfulness of climate	Same	Same
Rainfall	.....	Heavier
Hazard of storms in lake navigation	.....	Great
Hazard of earthquake interference	Small	Larger
Greater distance, New York to San Francisco, miles, via	363	.....
Greater distance New Orleans to San Francisco, miles, via.	580	.....
Quicker passage of ten-knot ship, New York to San Francisco, hours, via	.....	29
Quicker passage of fifteen-knot ship, New York to San Francisco, hours, via	.....	12
Quicker passage of twenty-knot ship, New York to San Francisco, hours, via.	.....	4
American ports to west coast of South America	Shorter	.....
American ports to Asia, Philippines, etc.	Same	Same
European ports to west coast of South America	Shorter	.....
European ports to North Pacific points	.....	Shorter
European points to Asia	Same	Same

The canal extends from a six-fathom line in Colon harbor on the Atlantic to a six-fathom line off Panama on the Pacific. The first 16 miles from the Atlantic to Bohio is a tide level canal. At Bohio a dam will be thrown across the Chagres River. This dam will be of sufficient height to form a lake in the valley of the Chagres, whose surface will be 90 feet above sea level and whose area will be sufficient to provide for all overflow in the rainy season. At this point there will be a set of locks whose combined lift will be 90 feet. From these locks the canal traverses Lake Bohio for 14 miles. There are two sets of locks at the Pacific terminus of the summit level, 8½ miles from the Pacific terminus.

The effect of the Panama Canal on the world's commerce will probably exceed the anticipation of those who were the most influential in securing the passage of the measures by which its construction is assured. Its strategic importance is even greater than that of the Suez Canal and its opening will change many of the ocean routes of the world. It will also constitute a waterway which will become a strong competitor of our transcontinental railway lines and probably it will divert from them a considerable portion of the transcontinental traffic.

From a national point of view, the completion of this canal will be invaluable, as it will give us ready water communication between the Atlantic and Pacific coasts and also place Hawaii and the Philippine Islands, in point of communication, several thousand miles nearer the seat of government than they now are.

Pan-American Congress.—Owing to the efforts of James G. Blaine, delegates from the republics of Mexico and the Central and South American states assembled at Washington, October 2, 1889, for the purpose of discussing the formation of an American Customs Union, under which the trade of American nations with each other might be maintained. The congress continued without final adjournment for five months, and voted to recommend the establishment of regular communications betweeen the ports of the several American states, from trade and customs regulations, weights and measures, patent, copyright, and trade-mark laws, a common legal tender silver coin, and a plain arbitration of all questions and disputes. It adjourned April 19, 1890.

The Congress of 1901–1902.—The second Pan-American Congress, embracing all the American republics, convened in the city of Mexico, Oct. 22, 1901. The body organized by electing Lic. Genaro Raijosa, delegate from Mexico, president, and Jose Hyanos, of Brazil, first vice-president.

The main purposes of this congress were the same as those of the former convention. Reciprocity treaties and the formation of some definite plan for the arbitration of all difficulties and disputes between the signatory powers occupied the greater portion of the time. Plans for the construction of a railway to connect North and South America, for the establishment of a standard coin which shall be legal tender in all the countries represented, for a uniform system of quarantine, and, in general, for bringing the American Republics closer together in all their relations and interests were recommended. A plan for arbitration based on that of the "Peace Congress at the Hague" (which see) was adopted. The congress adjourned Jan. 31, 1902. See *Bureau of American Republics.*

Pan-American Exposition, an exposition held at Buffalo, N. Y., from May to November, 1901, to show the progress made by the American Republics during the 19th century.

The Pan-American Exposition Company was incorporated in 1897, but the breaking out of the war with Spain caused an indefinite postponement of the enterprise. In March, 1898, the company perfected its organization, elected a board of directors, and secured the approval of the City of Buffalo and the State of New York. The organization contained twenty-five directors and the following officers: President, John G. Milburn; Secretary, Edwin Flemming; Treasurer, George L. Williams; Chairman Executive Committee, John L. Satcherd; Director-General, William I. Buchanan. The United States Government appropriated $500,000 for special exhibits, and most of the states made appropriations for state buildings and special state exhibits; aside from this the expense of the exposition, amounting to $10,000,000, was assumed by the citizens of Buffalo. The gates were opened to the public on May 1, but the exposition was not formally opened until May 20. Eighteen countries, including Cuba and Hayti, made exhibits. Venezuela, Paraguay, and Uruguay were not represented. The exposition was closed on Nov. 2. The total attendance was 8,334,803. The stockholders suffered a loss of about $3,000,000.

Architecturally the Pan-American Exposition will have an abiding place in American history. Within an area of 350 acres was brought together an array of landscape, buildings, statuary, and color such as has not before been seen in America, if in the world. The architecture was of the styles common in the South American countries, and belonged to the more modern ornate Renaissance. The only exception to this was the Electric Tower, which was essentially American, and of a more simple and classic style. It had a height of 409 feet. The harmonious blending of the colors used in decorating the buildings created the "Rainbow City," remarkable for its brightness and beauty. The greatest success of the Exposition, however, was in the plan adopted for lighting the buildings and grounds. Never before has such an opportunity been offered for the display of electric lights, since the exposition could make use of the great power plant at Niagara Falls for its source of electricity, and never before has such a display of artificial lighting been made. By using a large number of incandescent lights of low candle power, the light was evenly diffused, strong shadows avoided, and a most beautiful effect produced. The Electric Tower, which was the focus of the architectural and lighting scheme, contained 40,000 incandescent lamps and 100 search lights, while 200,000 incandescent lights were employed to light the Esplanade and Court of Fountains. The installation of these lights required over 400 miles of wire, weighing 250 tons.

Panay, an island of the Philippines, between Mindoro and Negros. It is of triangular form, about 100 mi. broad and 100 mi. long. It is mountainous but very fertile, and the inhabitants have made considerable progress in civilization. Capital Iloilo. Pop. 799,816.

Pando'ra, in Greek mythology, the first woman on earth, sent by Zeus to mankind in vengeance for Prometheus's theft of heavenly fire. Each of the gods gave her some gift fatal to man. According to later accounts the gods gave her a box full of blessings for mankind, but on her opening the box they all flew away, except hope.

Pan'iput, a town of India in the Punjab, 50 mi. n. by w. of Delhi; surrounded by an old wall. Pop. 25,022.

Pantheism, in philosophy, the doctrine of the substantial identity of God and the universe, a doctrine that stands midway between atheism and dogmatic theism. The origin of the idea of a God with the theist and pantheist is the same. It is by reasoning upon ourselves and the surrounding objects of which we are cognizant that we come to infer the existence of some superior being upon whom they all depend, from whom they proceed, or in whom they subsist. Pantheism assumes the identity of cause and effect. Matter, not less than mind, is with it the necessary emanation of the Deity. The unity of the universe is a unity which embraces all existing variety, a unity in which all contradictions and all existing and inexplicable congruities are combined. Pantheism has been the foundation of nearly all the chief forms of religion which have existed in the world. It was represented in the East by the Sankhya of Kapila, a celebrated system of Indian philosophy. The Persian, Greek, and Egyptian religious systems were also pantheistic. Spinoza is the most representative pantheist of modern times. A twofold division of pantheism has been proposed: 1. That which loses the world in God, one only being in whose modifications are the individual phenomena. 2. That which loses God in the world and totally denies the substantiality of God.

Pantheon (or pan-the'on), a celebrated temple at Rome, built in 27 B. C. by Marcus Agrippa. It is a large edifice of brick, built in circular form, with a portico of lofty columns. It has the finest dome in the world (142½ ft. internal diameter, 143 ft. internal height), and its portico is almost equally celebrated. It is now a church, and is known as Santa Maria Rotonda. Raphael and other famous men are buried within its walls. The Pantheon in Paris, for some time the church of St. Geneviève, is a noble edifice with a lofty dome, devoted to the interment of illustrious men.

Panther, one of the Felidæ or Cat tribe, of a yellow color, diversified with roundish black spots, a native of Asia and Africa. The panther is now supposed to be identical with, or a mere variety of, the leopard. The name panther is given to the puma in this country.

Papacy. See *Pope.*

Papal States, the name given to that portion of Central Italy of which the pope was sovereign by virtue of his position. The territory extended irregularly from the Adriatic to the Mediterranean, and latterly comprised an area of 15,289 sq. mi. with 3,126,000 inhabitants. Rome was the capital. See *Pope.*

Paper

Paper, a thin and flexible substance, manufactured principally of vegetable fiber, used for writing and printing on, and for various other purposes. Egypt, China, and Japan are the countries in which the earliest manufacture of paper is known to have been carried on. The Egyptian paper was made from the papyrus (whence the word *paper*), but this was different from paper properly so called. According to the Chinese the fabrication of paper from cotton and other vegetable fibers was invented by them in the second century B.C. From the East it passed to the West, and it was introduced into Europe by the Arabs. Spain is said to have been the first country in Europe in which paper from cotton was made, probably in the eleventh century; and at a later period the manufacture was carried on in Italy, France, and Germany. It cannot now be ascertained at what time linen rags were first brought into use for making paper; but remnants of Spanish paper of the twelfth century appear to indicate that attempts were made as early as that time to add linen rags to the cotton ones. The earliest paper manufactory known to have been set up in England was that of John Tate, at Stevenage, in Hertfordshire, about 1495. The manufacture in England, however, long remained in a backward state, so that until late in the eighteenth century the finer qualities of paper were imported from France and Holland.

After the introduction into Europe of cotton and linen rags as materials for paper-making, other vegetable fibers were for many centuries almost entirely given up, rags being cheaper than any other material. It was only about the close of the eighteenth century that paper manufacturers again began to turn their attention to the possibility of using vegetable fibers as substitutes for rags, one of the earliest signs of the new departure being a work containing sixty specimens of paper made from different vegetable materials, published in 1772 by a German named Schöffer or Schäffers. Straw, wood, and esparto are the chief vegetable fibers which have been found most suitable for the purpose.

The process by which paper is produced depends on the minute subdivision of the fibers, and their subsequent cohesion; and before the making of paper properly begins the rags or other materials have to be cleaned from impurities, boiled in a strong lye, and reduced by special machinery to the condition of a thin pulp, being latterly bleached with chloride of lime. It is at this stage of the manufacture that size is added, and toned and other colored papers have the coloring matter introduced. The pulp, composed of the fibrous particles mixed with water, is now ready to be made into paper.

Wood-pulp Paper.—Wood pulp is made from the spruce tree. The logs are brought to the wood-pulp mill and cut into short lengths from 16 in., to 4 ft. long. The bark is removed before it is ground into pulp. The wood is then carried to the grinder. The grindstone is about 2 ft. thick. The log is held by hydraulic pressure against the stone, and water is put on the stone to keep the wood from burning. The stone rubs or grinds the log into a pulp, which falls down on a screen, where the splinters and slivers are caught, the fine pulp passing through the meshes. A pump sucks up the pulp through the vat to a brass plate, which is perforated with small holes. The pulp is really a liquid, capable of being pumped or carried in a stream from place to place, and it is next pumped upon what is known as the "wet machine." It is then spread on a woolen blanket, where some of the water is pressed out of it, and it is left in layers which are called "laps." In this condition it looks like a newspaper, which after being soaked in water is squeezed in the hand. It is solid enough to be carried about, and the layers are made into bundles which weigh about 100 pounds. In this condition it is shipped to the paper mill.

Paper made entirely of wood pulp would not be strong enough to stand the wear and tear of printing presses. The grinder breaks up the fibers so that the paper would not hang together in passing over the tapes, through the rolls and cylinders and folders. To give the paper strength, it has been the custom to add rags, flax, cotton waste, and other fibers to the wood pulp. Most of the newspapers nowadays are made entirely of wood pulp, and what is known as sulphite fiber has taken the place of other fibers. This fiber is really wood pulp, but is not made by grinding, and the fibers therefore are not broken up. The sulphite is made by boiling the wood in a large boiler with steam and a product of sulphur. The wood is disintegrated into fibers which retain their full length. The wood pulp and sulphite are mixed together in proper proportions, and, after they are thoroughly mixed, colored, and sized, the pulp becomes "half stock," and is pumped into tanks or vats, and then upon screens which catch any foreign substance which might be in the material. It is then ready for the paper machine. Here the pulp is spread over an endless mesh or screen which carries it toward the cylinders and rollers which make the finished paper. As the watery pulp goes toward the rolls, the screen vibrates and the water drops through and leaves the pulp a broad sheet of mushy paper. This sheet passes over perforated plates through which the remaining water is sucked by pumps. It is passed between rollers which press it into a more compact condition, and make it stronger. Again it is passed over rolls which squeeze it and deliver it to an endless belt of felt, which carries it over and under large cylinders heated by steam, and finally feeds it into the "calender" rolls, where the paper is smoothed and pressed into the finished product. From the last stock of calenders the paper is made into rolls and is then shipped to the newspapers ready for the presses.

Linen Paper.—Some wood-pulp paper is used in making cheap books, but the best books and writing paper and ledger paper are made from linen rags. These rags are brought to the mill just as they are gathered and are run

through a machine which shakes out all the dust and dirt. They are then carefully picked over and all the linen rags are taken out, buttons cut off, and they are ripped up into small pieces. From the rag-room the rags go to the cutters where they are sliced by machinery into tiny bits and they are then boiled in lime water to remove the color. They are then ground to a pulp and the rags become "half stock." After being whitened by bleaching, the half stock is taken to the beating machine which completes the pulping process, and it is then taken to the paper machine. In the wood-pulp paper machine the paper is not water marked, but the linen-paper makers brand their product. This is done when the paper sheet passes under the roll of the machine, just before it passes over the perforated brass plates through which the remaining water is sucked. This roll, known as the "dandy roll," is covered with a brass wire, and the design formed by the wires, whether letters or trademark, is made on the paper as it passes under the roll. If a series of parallel marks is made, the paper is called wove or laid. From the dandy roll on the process of finishing the paper is similar to that used in making wood-pulp paper. The hand-made papers are made by dipping the pulp from a vat with a sieve. The water runs through the sieve, and the solid pulp spread in a thin sheet is left on the bottom. The sieve is turned upsidedown and the sheet is dropped on a board. The paper is then finished by passing it between smooth, heavy iron rollers. Paper is used for car wheels, barrels, buckets, boats, tubs, clothing, and even paper horseshoes. Boards and planks are made of paper. They can be sawed like wood and made into buildings. Paper is molded into picture frames and architectural decorations, and artificial leather is made of paper chemically treated.

Paper was made from straw at the beginning of the present century, and the material is now largely used. The chief and best use of straw is to impart stiffness to common qualities. To prevent brittleness, however, it is necessary to destroy the silica contained in the straw by means of strong alkali. Paper is now also made entirely from wood, previously reduced to a pulp. Esparto or Spanish grass, exported largely from Spain, Algeria, Tripoli, Tunis, and other countries, has been applied to paper making only in comparatively recent years, but has risen rapidly into favor. The use of rushes for paper making belongs to America, and dates from the year 1866. The root of the lucern has also been applied with success in France of late years to the fabrication of paper. Various mineral substances are sometimes added to the fibrous materials necessary to make paper, such as a silicate of alumina called Lenzinite, kaolin or porcelain earth, and artificial sulphate of barium (permanent white). The first two substances diminish the tenacity of the fabric; the last is thought by some manufacturers to be beneficial to printing papers, enabling them to take a clearer impression from the ink.

Blotting and filtering paper are both made in the same way as ordinary paper except that the sizing is omitted. Copying paper is made by smearing writing paper with a composition of lard and black lead, which, after being left alone for a day or so, is scraped smooth and wiped with a soft cloth. Incombustible paper has been made from asbestos, but since fire removes the ink from a book printed on this material, the invention is of no utility, even though the paper itself be indestructible. Indelible check paper has been patented on several occasions. In one kind of it the paper is treated with an insoluble ferrocyadine and an insoluble salt of manganese, and is sized with alumina instead of alum. Parchment paper or vegetable parchment is made from ordinary unsized paper by treatment with sulphuric acid or oil of vitriol and ammonia. The so-called rice paper is not an artificial paper, but a vegetable membrane imported from China, and obtained apparently from the pith of a plant called *Aralia papyrifera*. Tissue paper is a very thin paper of a silky softness used to protect engravings in books and for various other purposes. Tracing paper is made from tissue paper by soaking it with Canada balsam and oil of turpentine or nut oil and turpentine.

In recent times the uses of paper have greatly multiplied. Besides being largely employed for making collars, cuffs, and other articles of dress, it is sometimes used for making boats, pipes, and tanks for water; cuirasses to resist musket bullets, wheels for railway carriages, and even bells and cannons. Paper wheels have been used for some of Pullman's railway saloon cars, and have worn out one set of tires. Cannons made of paper have actually been tried with success. The dome of the new observatory at Greenwich is made of papier-maché. In the production of paper America, England, Germany, and France take the lead.

Paper Hangings, ornamental papers often pasted on the walls of the rooms in dwelling houses. The staining of papers for this purpose is said to be a Chinese invention, and was introduced into France at the beginning of the seventeenth century. It is now common everywhere, but more especially in the U. S., France and England. Most of the processes in paper staining are now usually done by machinery; but there is still much handwork in the finer qualities. The first operation is that of grounding, which consists in covering the surface with some dull color, the tint of which varies. Papers with a glazed ground are usually glazed immediately after receiving the ground tint. The designs on the surface of paper hangings are applied by hand processes and machines exactly similar to those employed in calico printing. *Flock paper* is made by printing on the parts which are to receive the flock a mixture of strong oil boiled with litharge and white lead, to render it drying. The colored flock is then sprinkled on the paper, and adheres to the parts to which the mixture has been applied.

Pa'phos, the name of two ancient cities in Cyprus—Old Paphos, a little more than a mile distant from the southwestern coast, upon a height, and New Paphos (modern *Baffa*), 7 or 8 mi. to the n.w. of old Paphos, situated on the sea shore. The first was famous in antiquity for the worship of Aphroditē (Venus). At New Paphos St. Paul preached before the proconsul Sergius.

Papier Mâché (pāp-yā mä-shā), a substance made of cuttings of white or brown paper boiled in water, and beaten in a mortar till they are reduced into a kind of paste, and then boiled in a solution of gum arabic or of size to give tenacity to the paste. Sulphate of iron, quicklime, and glue or white of egg, are sometimes added to enable the material to resist the action of water, and borax and phosphate of soda to render it to a great extent fireproof. The uses to which papier mâché is put are almost limitless. Hollow telegraph poles made of paper pulp have been recently invented, and paper is taking the place of gutta-percha in the insulation of electric wires. Cigar boxes are made from thin paper board and are then scented with oil of cedar and colored and grained to imitate Spanish cedar. Straws for lemonade and other iced drinks are made of paper which is coated with paraffin to make the straws water tight. Rims for bicycles are made of paper pulp which has been subjected to tremendous hydraulic pressure. Paper is used in making stage furniture, armor, statues, and other accessories of scenic productions. When papier mâché is fully dry it is hard, tough, and light and can be painted any color, nailed, sawed, marbleized, bronzed, silvered, and fitted to place and will not crack as do wood, terra cotta, and plaster.

Papillæ, the name applied in physiology to small or minute processes protruding from the surface of the skin, or of membranes generally, and which may possess either a secretory or other function. The human skin exhibits numerous papillæ, with divided or single extremities, and through which the sense of touch is chiefly exercised. The papillæ of the tongue are important in connection with the sense of taste.

Papinia'nus, Æmilius (Papinian) (140–212), Roman lawyer, b. under Antoninus Pius. His learning and integrity won him the first offices of state, and he was ultimately chosen prefect of the prætorian guards under the Emperor Septimius Severus, whom he accompanied to Britain. The Emperor Caracalla caused him to be executed.

Papy'rus, an aquatic plant which has acquired celebrity from furnishing the paper of the ancient Egyptians. The root is very large, hard, and creeping; the stem is several inches thick, naked, except at the base, 8 to 15 or more ft. high, triangular above, and terminated by a compound, wide spreading, and beautiful umbel, which is surrounded with an involucre composed of eight large sword-shaped leaves. The little scaly spikelets of inconspicuous flowers are placed at the extremity of the rays of this umbel. Formerly it was extensively cultivated in Lower Egypt, but is now rare there. It is abundant in the equatorial regions of Africa in many places, and is found also in Western Africa and in Southern Italy. The inhabitants of some countries where it grows manufacture it into various articles, including sail cloth, cordage, and even wearing apparel and boats. Among the ancient Egyptians its uses were equally numerous, but it is best known as furnishing a sort of paper. This consisted of thin strips carefully separated from the stem longitudinally, laid side by side, and then covered transversely by shorter strips, the whole being caused to adhere together by the use of water and probably some gummy matter. A sheet of this kind formed really a sort of mat. In extensive writings a number of these sheets were united into one long roll, the writing materials being a reed pen and ink made of animal charcoal and oil. Thousands of these papyri or papyrus rolls still exist (many of them were found in the ruins of Herculaneum), but their contents, so far as deciphered, have only been of moderate value.

Papyrus.

Pará (or Belem), a city and seaport in Brazil, capital of the province of Pará, on the right bank of the estuary of the Pará. The principal buildings are the governor's palace, the cathedral, and the churches of Santa Anna and São João Baptista. It is the seat of the legislative assembly of the province. The port, defended by forts, is capable of admitting vessels of large size. The principal exports are caoutchouc, cacao, Brazilnuts, copaiba, rice, pias-

sava, sarsaparilla, annotto, cotton, etc. Pop. est. at from 55,000 to 60,000. The province of Pará, the most northerly in Brazil, comprises an area of 443,790 sq. mi. on both sides of the lower Amazon, and consists chiefly of vast alluvial plains connected with this river and its tributaries. These latter comprise the Tapajos and the Xingu, besides many others; the Tocantins being another great stream from the south. The province possesses immense forests, and is extremely fertile, but there is little cultivation, the inhabitants being fewer than one to the square mile. The trade centers in the capital. It is now facilitated by steamboats navigating the Amazon and Tocantins. Pop. 443,653.

Paracel'sus (or PHILIPPUS AUREOLUS THEOPHRASTUS BOMBASTUS VON HOHENHEIM) (1493–1541), empiric and alchemist, b. at Einsiedeln, in the canton of Schwyz, in Switzerland. In the course of his travels he became acquainted with remedies not in common use among physicians, by means of which he performed extraordinary cures, and obtained great reputation. In 1526 he accepted the chair of medicine offered him by the magistrates of Basel, and lectured there till the spring of 1528. He died at the hospital of St. Sebastian at Salzburg. For a long time he was regarded as little better than a charlatan, but he enriched science, particularly chemistry and medicine, with some valuable discoveries.

Parachute (pa'ra-shöt), an apparatus of an umbrella shape and construction, usually about 20 or 30 ft. in diameter, attached to balloons, by means of which the aeronaut may descend slowly from a great height. It is shut when carried up, and expands of itself when the aeronaut begins to descend; but it is not altogether to be depended on, and accidents in connection with its use have been frequent. The earliest mention of a machine of this kind is in a MS. describing experiments made with one in 1617. In 1783 the French physician Lenormand made several further experiments at Montpellier; and shortly after the machine became well known through the descents of Blanchard in Paris and London.

Paradise, the garden of Eden. The word is originally Persian, and signifies a park. It was introduced into the Greek language in the form of *paradeisos* by Xenophon, and has been introduced into modern languages as a name for the garden of Eden.

Par'affin, a solid white substance of a waxy appearance which is separated from petroleum and ozokerit, and is also very largely obtained by the destructive distillation of various organic bodies, such as brown coal or lignite, bituminous coal, shale, etc. The process generally consists in heating bituminous shale in iron retorts at a low red heat; condensing the tarry products, and purifying these by distillation, washing successively with soda, water, and acid, and again distilling. Those portions of the oil which solidify in the final distillations are collected separately from the liquid portions, washed with soda and acid, and crystallized or again distilled. The partially purified paraffin is now again treated with acid, allowed to solidify, submitted to the action of centrifugal machines, and finally strongly pressed in order to remove any liquid oil which may still adhere to it. The refined paraffin is largely manufactured into candles, which may be either white or colored, and may be mixed with a certain quantity of wax, etc. The liquid oils obtained in the process come into commerce under the general name of paraffin oil, the lighter oils being used for illuminating and the heavier for lubricating purposes. The operations of the oil refinery are; 1, distillation, 2, the treatment with chemicals, 3, cooling and pressing the heavy oil containing paraffin so as to separate the solid hydrocarbons from the liquid. The oils are distilled several times and are fractionated into the various qualities required; and between each distillation the oil is treated with oil of virtriol and with caustic soda. After the finishing treatment with acid and soda some of the soda compounds are retained in solution by the oil; these have to be carefully removed by washing with water. The absence of acid and alkaline compounds, and thorough fractionation of the oil, are the great secrets in the refining of burning oils. Besides being used for candles, it is used for vestas and tapers, for water-proofing, sizing and glazing fabrics, as an electric insulater, as a coating for the inside of beer barrels, etc.

Paraguay (pä'rä-gwī), a republic of South America, surrounded by the Argentine Republic, Brazil, and Bolivia; separated from the first by the Paraná River, its tributary the Paraguay, and the Pilcomayo, a tributary of the latter; from Brazil by the Paraná, a range of hills, and the Apa, a tributary of the Paraguay; area 98,000 sq. mi. The whole surface belongs to the basins of the Paraguay and Paraná, numerous tributaries of which intersect the country. Along the Paraguay and in the south, adjoining the Paraná, are extensive swampy tracts; westward of the Paraguay the country is little known. Elsewhere the surface is well diversified with hill and valley, and rich alluvial plain. The climate is agreeable, the mean annual temperature being about 75°. The natural fertility of the soil is shown by a vegetation of almost unequaled luxuriance and grandeur. In the forests are found at least sixty varieties of timber trees, besides dyewoods, gums, drugs, perfumes, vegetable oils, and fruits. Many of the hills are covered with the *yerba maté* or Paraguay tea. The larger plains are roamed over by immense herds of cattle, which yield large quantities of hides, tallow, bones, etc.; and on all the cultivated alluvial tracts sugar cane, cotton, tobacco, rice, maize, etc., are raised in profusion. In 1891 the imports were valued at $1,802,000; the exports were valued at more than $3,166,000, and comprised mainly maté and tobacco. Asuncion, the capital, Paraguari, and Villa Rica are connected by a railway about 90 mi. long. Large river steamers ascend the Paraná and the Paraguay far above Asuncion.

Paraguay was originally a Spanish colony, the

first settlement being made in 1535. In 1608 a number of Spanish Jesuits established a powerful and well organized government, which lasted till 1758, when it was overthrown by the Brazilians and Spaniards. Early in the present century its isolated position enabled it by a single effort to emancipate itself from Spanish rule. Dr. Francia, secretary to the revolutionary junta in 1811, was elected consul, but exchanged the name for that of dictator in 1814, and thenceforward, by a rigorous system of espionage and the strict prohibition of all intercourse with other nations, retained his position till his death in 1840 at the age of eighty-four. In 1844 Don Carlos Antonio Lopez was elected president for ten years, and soon after the country was declared free and open both to foreigners and foreign commerce. Don Carlos Lopez remained president of Paraguay till his death in 1862, when he was succeeded by his son Don Francisco, who concluded treaties of commerce with the U. S., England, France, Brazil, etc., and did all in his power to promote the growth of agriculture and industry in the land. But a disastrous war with Brazil and the Argentine Republic, which broke out in 1864 and only closed with the death of Lopez in 1870, caused the death of far the greater portion of the male adults and entirely checked the progress of Paraguay. A popular constitutional government has since been established, and the state is now making rapid progress in population and prosperity. The people are largely half-breeds or of Indian blood. Before the war the population is said to have been over 1,000,000; after the war not more than a tenth of this. Pop. est. 1901, 700,000.

Paraguay, a river of South America, which rises in the Brazilian province of Matto Grosso, takes a course generally southward, and joins the Paraná at the southwest angle of the state of Paraguay after a course of some 1,300 mi. It receives the Pilcomayo, Vermejo, and other large rivers, and is a valuable highway of trade to Paraguay and Brazil.

Parahyba (pä-rä-ē'bä), a maritime province of Brazil, between Rio-Grande-do-Norte on the north and Pernambuco on the south; area 28,846 sq. mi. Much of the soil is of a sandy texture, though there are also extensive fertile tracts and large forests. Periodical droughts occur. Pop. 496,618. The capital, Parahyba, is a cathedral city situated on the river of the same name, about 11 mi. from its mouth. The harbor is much frequented by coasting vessels. Pop. 40,000.

Parakeets (or Parroquets), a sub-family or group of the Parrots characterized by their generally small size and their long tail feathers. The islands of the Eastern Archipelago form the chief habitat of these birds, but species also occur in India and Australia. Among the most familiar forms are the rose-ringed and Alexandrine parakeets. The former found in India and on the eastern coasts of Africa, has a bright green body and a pink circle round the neck. The Alexandrine parakeet of India is a nearly allied species. These birds may be taught to speak with distinctness. The ground parakeets of Australia live among the reeds and grass of swamps, generally in solitary pairs. The common ground parakeet of Australia possesses a green and black plumage, the tail being similarly colored, and the body feathers having each a band of dark brown hue. The grass parakeets of Australia, of which the small warbling parakeet is a good example, inhabit the central flat lands of Australia, and feed on the seeds of the grasses covering the plains. They perch on the eucalypti or gum trees during the day, and the nests are situated in the hollows of these trees. Contrary to most parrots they have an agreeable voice.

Parallel Motion, a mechanical contrivance employed by Watt to communicate the alternate pushes and pulls of the piston rod of a steam engine to the end of a vibrating beam, and which prevents the action of forces tending to destroy the right-line motion of the piston rod. The motion given to the end of the rod is not accurately in a straight line, but it is very nearly so. Watt's parallel motion is still employed in all stationary beam engines. In marine beam engines the arrangement employed differs somewhat in form, but is the same in principle as Watt's contrivance.

Parallelogram of Forces, an important dynamical principle, deduced by Newton, which may be stated thus: If two forces acting in different directions on a particle at the same time be represented in magnitude and direction by two straight lines meeting at the particle, their resultant effect in giving motion to the particle is that of a force represented in magnitude and direction by the diagonal of the parallelogram, of which the two former lines are two sides.

Paramari'bo, the capital of Dutch Guiana or Surinam, about 18 mi. above the mouth of the river Surinam, which is navigable for vessels of considerable size. It is the center of the Dutch West Indian trade, and exports sugar, coffee, etc. Pop. 28,831.

Paraná, a river in South America, the largest except the Amazon, and draining a larger basin than any other river in the Western Hemisphere except the Amazon and the Mississippi. It is formed by the junction of two streams, the Rio Grande and the Parnahyba which meet in Brazil, and it discharges itself into the estuary of the La Plata, its course latterly being through the Argentine Republic. Its principal tributaries are the Paraguay and the Salado, both from the right. All the tributaries on its left are comparatively short. Its length from its sources to its junction with the Paraguay is probably 1,500 mi., and thence to the sea 600 mi. more. In breadth, current, and volume of water, the Paraná has ten times the magnitude of the Paraguay, which is itself superior to the greatest European rivers. It is an important waterway to the interior of the country, though with obstructions at certain points.

Paraná, a province of Southern Brazil, having on the n. the province of São Paulo, e. the

Atlantic, s. the province of Santa Catharina, and w. Paraguay and the province of Matto Grosso; area 85,429 sq. mi. Its chief town is Curitiba. Pop. 187,548.

Paraphernalia, in law, a woman's apparel, jewels, and other things, which, in the lifetime of her husband, she wore as the ornaments of her person, and to which she has a distinct claim.

Par'asites, the name applied to animals which attach themselves to the exterior, or inhabit various situations in the interior, of the bodies of other animals, including such forms as tapeworms, flukes, scolices or hydatids, fish lice, bird lice, common lice, etc. True parasites obtain their nourishment from the animals on which they live, and there is another class of parasites that only obtain a lodging or abode at the expense of the animals they accompany.

Parasitic Diseases, such as are produced by parasitic animals or plants. Among the animals producing such diseases are the guinea worm, the louse, the trichina, tapeworms, etc. The vegetable parasites which produce disease in animals are either fungi or algæ. Ringworm is an example of this class of diseases.

Parasitic Plants, such plants as grow on others, from which they receive their nourishment. In this class are many fungi, such as the *Urēao caries*, which produces the formidable disease called bunt to which wheat is liable. Among larger parasites are the mistletoe; and the genus *Rafflesia*, belonging to Sumatra and Java. Parasites are distinguished from *epiphytes*, inasmuch as the latter, though they grow upon plants, are not nourished by them.

Parchment, the skins of sheep, she-goats, and several other animals, so dressed or prepared as to be rendered fit for writing on. This is done by stretching the skin on a frame, separating all the flesh and hair from the skin, reducing its thickness with a sharp instrument and smoothing the surface with a pumice-stone covered with pulverized chalk or slaked lime. After it is reduced to something less than half its original thickness, it is smoothed and slowly dried for use.

Pardee, Ario (1810–1892), coal operator and philanthropist, b. in Chatham, N. Y. One of the pioneers of the Pennsylvania anthracite region, he amassed several millions as a coal operator. His donations to Lafayette College amounted to $500,000. He was active in various charitable movements.

Pardon, the remission of the penalty of a crime or offense. In the U. S. the pardoning power is lodged in the president and the governors of the various states, and extends to all offenses except those which are punished by impeachment after conviction. In some states concurrence of one of the legislative bodies or of a pardoning board is required.

Pare (på-rā), Ambroise, the father of French surgery, b. early in the sixteenth century at Laval; studied at Paris. He acted for a time as an army surgeon, and in 1552 he became surgeon to Henry II, under whose successors he held the same post.

Parent and Child, besides being a natural relationship, has its legal aspects, in which legitimacy and illegitimacy form a clear distinction. All children born in lawful wedlock, or within a satisfactory time afterward, are considered legitimate; but the common law does not compel parents to maintain their children. If the parents fail to do so, however, in the case of a child unable to earn its own living, the poor law authority performs this duty, and by so doing can obtain the power, under an order from a justice of the peace, to compel the parents or other relatives to make a contribution for that purpose. Beyond this there is no legal provision for the maintenance of children by their parents; yet where the child contracts a debt, as for food, clothes, or education, the parents will usually be found liable. When the children are legitimate, it is provided by the common law that the father shall have them under his power until their majority; but it is now possible for the mother to apply to the courts for rights of access and custody while the children are within sixteen years of age. The latter right is usually granted when the father is shown to be a person of immoral character. At death parents may, under proper will, disinherit their children; but in the event of intestacy the children's share of the personal property is divided equally among them, while real estate falls to the heir.

Paren'thesis (pl. Parentheses), an explanatory or qualifying sentence, or part of a sentence, inserted into the midst of another sentence without being grammatically connected with it. It is generally marked off by upright curves ( ), but frequently by dashes — —, and even by commas.

Parhe'lion, a mock sun, having the appearance of the sun itself, and seen by the side of that luminary. Parhelia are sometimes double, sometimes triple, and sometimes more numerous. They appear at the same height above the horizon as the true sun, and they are always connected with one another by a white circle or halo. They are the result of certain modifications which light undergoes when it falls on the crystals of ice, rain drops, or minute particles that constitute suitably situated clouds. Parhelia which appear on the same side of the circle with the true sun are often tinted with prismatic colors.

Pa'ria, Gulf of, an inlet of the Atlantic on the northeast coast of South America, between the island of Trinidad and mainland of Venezuela, inclosed on the north by the Peninsula of Paria. It possesses good anchorage, and receives arms of the Orinoco.

Parian Marble, a mellow tinted marble, highly valued by the ancients, and chosen for their choicest works. The principal blocks were obtained from Mount Marpassus, in the island of Paros.

Pari passu, in law, a term signifying equally in proportion, without preference; used especially of the creditors of an insolvent estate who (with certain exceptions) are entitled to payment of their debts in shares proportioned to their respective claims.

Paris, Edgar co., Ill., on Sugar Creek. Railroads: C. C. C. & St. L.; St. Louis division and Cairo division Vandalia; T. H. & P. division. Industries: five flouring mills, broom company, three iron foundries, broom-corn machinery, and carriage factory. Coal in vicinity. Surrounding country agricultural. The town was first settled in 1823, and became a city in 1871. Pop. 1900, 6,105.

Paris, the capital of France and of the department of the Seine. The city lies in the Seine valley surrounded by heights. Through the valleys, the river runs from east to west, enclosing two islands, upon which part of the city is built. It is navigable by small steamers. The quays or embankments, which extend along the Seine on both sides, being built of solid masonry, protect the city from inundation, and form excellent promenades. The river, 530 ft. in width, is crossed by numerous bridges. The city is surrounded by a line of fortifications which measures 22 mi.; outside of this is the enceinte, while beyond that again are the detached forts. These now form two main lines of defense. The inner line consists of sixteen forts, the outer line of eighteen forts besides redoubts; the area thus enclosed measuring 430 sq. mi., with an encircling line of 77 mi. The climate of Paris is temperate and agreeable. The city is divided into twenty arrondissements, at the head of each of which is a *maire.* Each arrondissement is divided into four quarters, each of which sends a member to the municipal council. The council discuss and vote the budget of the city. At the head is the prefect of the Seine and the prefect of police. The water supply of the city is derived from the Seine and the Marne, from the Ourcq Canal, from artesian wells, and from springs. The houses of Paris are almost all built of white calcareous stone, and their general height is from five to six stories, arranged in separate tenements. In the older parts of the city the streets are narrow and irregular, but in the newer districts the avenues are straight, wide, and well paved. What are known as "the boulevards" include the interior, exterior, and military. That which is specifically called *The Boulevard* extends, in an irregular arc, on the north side of the Seine, from the Place de la Bastile in the east to the Place de la Madeleine in the west. Here may be noted the magnificent triumphal arches of Porte St. Denis and Porte St. Martin, the former of which is 72 ft. in height. On the south side of the Seine the boulevards are neither so numerous nor so extensive. The exterior boulevards are so named because they are outside the old *mur d'octroi;* and the military boulevards, still further out, extend round the fortifications. There are six passenger stations for the railways to the various parts of the country, and a railway around the city. There are also tramway lines to Versailles, St. Cloud, and other places in the suburbs. The most notable public squares or *places* are the Place de la Concorde, one of the largest and most elegant squares in Europe; Place de l'Etoile, in which is situated the Arc de Triomphe; the Place Vendôme, with column to Napoleon I; Place des Victoires, with equestrian statue of Louis XIV, etc. Within the city are situated the gardens of the Tuileries, which are adorned with numerous statues and fountains; the gardens of the Luxembourg, in which are fine conservatories of rare plants; the Jardin des Plantes; and others. The most extensive parks are outside the city. Of these the Bois de Boulogne, on the west, covers an area of 2,150 acres, gives an extensive view toward St. Cloud and Mont Valérien, comprises the race courses of Longchamps and Auteuil, and in it are situated lakes, an aquarium, conservatories, etc. The Bois de Vincennes, on the east, even larger, is similarly adorned with artificial lakes and streams, and its high plateau offers a fine view over the surrounding country. The most celebrated and extensive cemetery in Paris is Père la Chaise (106½ acres), finely situated and having many important monuments. The Catacombs are ancient quarries which extend under a portion of the southern part of the city.

Of the churches of Paris the most celebrated is the Cathedral of Notre Dame, situated on the islands of the Seine. It is a vast cruciform structure, with its lofty west front flanked by two square towers, the walls sustained by many flying buttresses, and the eastern end octagonal. The church of La Madeleine, a modern structure, stands on an elevated basement fronting the north end of the Rue Royale. Others are the church of St. Geneviève, set apart under the title of the Pantheon, as the burying place of illustrious Frenchmen; St. Eustache; St. Germain l'Auxerrois; St. Gervais; St. Roch; St. Sulpice; etc. On the very summit of Montmartre is the Church of the Sacred Heart. The Protestant churches are the Oratoire and Visitation, and chapels belonging to English, Scotch, and American denominations. There are also a Greek chapel and several synagogues.

Notable among the public buildings of Paris are its palaces. The Louvre, a great series of buildings within which are two large courts, is now devoted to a museum; palace of the Tuileries; the palace du Luxembourg; the Palais Royal; the Palais de l'Elysée; the residence of the president of the republic; the Palais du Corps Législatif in which the chamber of deputies meets; and others. The Hôtel de Ville is situated in the Place de l'Hôtel de Ville, formerly Place de Gréve, on the right bank of the river. The Hôtel des Invalides is now used as a retreat for disabled soldiers. It contains the burial place of the first Napoleon. The Palais de Justice is an irregular mass of buildings. The Tribunal de Commerce is a quadrangular building enclosing a large court. The mint contains an immense collection of coins and medals. The other principal government buildings are the Treasury and the Record Office. The Exchange is in the form of a parallelogram, 212 ft. by 126 ft., surrounded by a range of sixty-six columns. A distinctive feature are the extensive markets, among the most important of

which are the Halles Centrales. A notable unique structure is the Eiffel Tower. It is a structure of iron latticework 984 ft. high, and having three stages or platforms. It is the highest building in the world.

The chief institution of higher education is the academy of the Sorbonne. Among others are the secondary schools or lycées, the most important of which are Descartes, St. Louis, Corneille, Charlemagne, Fontanes, De Vanves, the Ecole Polytechnique, Ecole des Beaux Arts, etc. Of the libraries the most important is the Bibliothèque Nationale, the largest in the world. The number of printed volumes which it contains is estimated at 2,500,000, besides 3,000,000 pamphlets, manuscript vols., historical documents, etc. The other libraries are those of the Arsenal, St. Geneviève, Mazarin, De la Ville, De l'Institut, De l'Université (the Sorbonne). Among museums, besides the Louvre and the Luxembourg, there may be noted the Musée d'Artillerie, in the Hôtel des Invalides; the Conservatoire des Arts et Métiers; the Trocadéro Palace; and the Cluny Museum. The chief of the learned societies is the Institute of France. There are many hospitals in Paris, also numerous establishments of a benevolent nature. The theaters of Paris are more numerous than those of any other city in the world. The most important are the Opera House, a gorgeous edifice of great size; the Opéra Comique, the Théâtre Français, the Odéon; the Théâtre de la Gaîté, and Théâtre des Folies Dramatiques. The most important manufactures are articles of jewelry and the precious metals, trinkets of various kinds, fine hardware, paper-hangings, saddlery and other articles in leather, cabinet-work, carriages, various articles of dress, silk and woolen tissues, particularly shawls and carpets, Gobelin tapestry, lace, embroidery, artificial flowers, combs, machines, scientific instruments, types, books, engravings, refined sugar, tobacco, chemical products, etc. That which is distinctively Parisian is the making of all kinds of small ornamental articles, which are called *articles de Paris*. Pop. 2,447,957.

The first appearance of Paris in history is on the occasion of Cæsar's conquest of Gaul, when the small tribe of the Parisii were found inhabiting the banks of the Seine, and occupying the island now called Île de la Cité. It was a fortified town in 360 A.D., when the soldiers of Julian here summoned him to fill the imperial throne. In the beginning of the fifth century it suffered much from the northern hordes, and ultimately fell into the hands of the Franks, headed by Clovis, who made it his capital in 508. In 987 a new dynasty was established in the person of Hugo Capet, from whose reign downward Paris has continued to be the residence of the kings of France. In 1437 and 1438, under Charles VII, Paris was ravaged by pestilence and famine, and such was the desolation that wolves appeared in herds and prowled about the streets. Under Louis XI a course of prosperity again commenced. In the reign of Louis XIV the Paris walls were leveled to the ground after having

stood for about 300 years, and what are now the principal boulevards were formed on their site (1670). Only the Bastile was left (till 1789), and in place of the four principal gates of the old walls, four triumphal arches were erected, two of which, the Porte St. Denis and Porte St. Martin, still stand. Many of the finest edifices of Paris were destroyed during the Revolution, but the work of embellishment was resumed by the directory, and continued by all subsequent governments. The reign of Napoleon III is especially noteworthy in this respect; during it Paris was opened up by spacious streets and beautified to an extent surpassing all that had hitherto been effected by any of his predecessors. The most recent events in the history of Paris are the siege of the city by the Germans in the war of 1870–71, and the subsequent siege carried on by the French national government in order to wrest the city from the hands of the Commune. Paris has been the scene of international exhibitions in 1855, 1867, 1878, 1889 (in commemoration of the French Revolution), and 1900.

Paris Exposition of 1900.—The universal exposition in 1900 at Paris opened April 14, and closed November 12. The exposition grounds were located in the center of the city. The two quadrilaterals forming the exposition (the one comprising the art palace, the new bridge and Esplanade of the Invalides, the other the Trocadero with the series of pavilions stretching to the Salle des Fêtes and Military School) were united by the two banks of the Seine river. On account of the necessary separation by city monuments and streets, large elevated sidewalks connected the several sections, thus making it possible to visit the entire exposition without going outside. The area enclosed was 543.62 acres, including the annex at Vincennes where most of the machinery was exhibited, and where the athletic contests took place.

Classification.—In his report, the Commissioner-General said, "Among the difficulties to be overcome, the most formidable is due to the fact, that the different branches of artistic production, agricultural, or indnstrial, have innumerable points of contact interlacing each other, intermingling almost to the point of confusion; and, in many instances the exhibits are of such a mixed character that a natural hesitation arises as to which category they should really be placed under. They may be appreciated for their intrinsic qualities, or for the uses to which they may be put. A large number change their classification by successive developments. Wool, for example, a product derived from sheep farming, becomes the principal material in the weaving of stuffs for clothing, for curtains and for furniture. Duplication is necessary to overcome this difficulty and the varied classes so closely allied are placed together. We have taken as a basis for classification that of the Exhibition of 1889 and entirely reconstructed it."

The exhibits were classified in eighteen departments as follows: 1. Education and In-

struction; 2. Works of Art; 3. Instruments and general methods of letters, science and arts; 4. Machinery and processes of mechanism; 5. Electricity; 6. Civil engineering and transportation; 7. Agriculture; 8. Horticulture; 9. Forestry, hunting, fishing, crop-gathering; 10. Alimentation; 11. Mines and metallurgy; 12. Decoration and furniture of public buildings and dwellings; 13. Cotton fabrics, textures and clothing; 14. Chemical industry; 15. Various industries; 16. Social economy, hygiene and public assistance; 17. Colonization; 18. Territorial and naval armies.

Architecture.—From an architectural standpoint this exposition was the most artistic the world has ever seen. In every group a retrospective exhibit was arranged to show the growth during the past 100 years. In every department centennial displays were exhibited. The immense reunion of palaces with unheard of richness of statuary, low reliefs, pediments, domes, pillars and columns, shows the different characteristics of the centuries. One of the features was the monumental entrance, which had three arches, each 65 feet wide. arranged triangularly to support a cupola.

Another feature was the bridge, Pont Alexander III. It has but one arch which is 355 feet long and 131 feet wide. The corner stone was laid by the Czar. The bridge is sufficiently high to allow boats to pass, and yet it does not obstruct the view from the avenue. The large art gallery (Grand Palais) fronts on Avenue Nicholas II, which continues from the bridge. The front is Roman in style, the other parts being inspired by the Chateau at Versailles. The structure will be used in the future for annual art exhibitions, etc. More beautiful and in better taste is the little palace (Petit Palais) just across the avenue. It is triangular in form and has 32 Ionic columns in the facade. This will be used as a museum.

United States.—The United States was represented officially by Ferdinand W. Peck as Commissioner-General. Seven buildings were erected covering a space of 338,987 square feet. There were more then 7,000 exhibitors and 30,000 exhibits. The U. S. pavilion was erected at a cost of about $150,000. The interior was a vast hall surrounded by four stories of rooms where an American could be at home with his friends, supplied with papers, books, a postoffice, a bureau of information, a restaurant, etc. There were no exhibits in this building. The United States made a good showing in every department, but perhaps the most conspicuous showing was in the art department. More prizes were awarded in this department than to any other foreign nation.

There were 42,832 awards in all distributed among 75,531 exhibitors. Of course, France received the highest number; the United States was second with 1,981 awards of the following classes: 220 grand prizes; 486 gold medals; 583 silver medals; 422 bronze medals; 270 honorable mentions, and the rest in medals for collaborators. In regard to the success of Americans, United States Commissioner-General Peck said: "In number as well as in quality the awards given to the United States exhibitors were superior to those obtained by any other foreign country. The United States in this respect comes next to France herself."

Comparing this exposition with the Paris exposition of 1889—the attendance in 1889 was about 25,000,000. In 1900, 50,470,400 persons entered the grounds. Sixty-five million tickets were issued and all sold at 20 cents each before the exposition opened. These tickets could be purchased only outside the grounds from the hawkers or Credit Lyonnais booths at various prices—as low as 1 cent on the last day. November 7 was a free day; attendance 438,481. Exhibitors in 1889, 56,612; in 1900, 76,246. Of these France and her colonies had 35,764; foreign nations, 40,479. Weight products in 1889, 30,133 tons; in 1900, 61,352 tons. The power used in running the exposition in 1889 was 9,773 horse power; in 1900 it was 36,200 horse power. The leading foreign nations in 1900 had the following number of exhibits: United States, 7,000; Germany, 3,000; Great Britain, 1,000. There were over 200 American citizens decorated by the French government. The exposition closed November 12.

Paris, in Greek mythology, also called Alexander, the second son of Priam, king of Troy, by Hecuba. His mother dreamed before his birth that she had brought forth a firebrand, which was interpreted to mean that he would cause the destruction of Troy. To prevent this the child was exposed on Mount Ida, where he was discovered by a shepherd who brought him up as his own son. Here his grace and courage commended him to the favor of Œnone, a nymph of Ida, whom he married. At the marriage of Peleus and Thetis a dispute arose whether Hera, Athena, or Aphroditē was the most beautiful, and as such entitled to the golden apple. Paris was chosen judge, and decided in favor of Aphroditē, who had promised him the fairest woman in the world for his wife. Subsequently he visited Sparta, the residence of Menelaus, who had married Helena (or Helen), the fairest woman of the age, whom he persuaded to elope with him. This led to the siege of Troy, at the capture of which he was killed by an arrow.

Paris, Louis Albert Philippe d'Orleans, Comte de (1838–94), son of the Duc d'Orleans, and grandson of Louis Philippe. After the revolution of 1848 he resided chiefly in Claremont, England, where he was educated by his mother. During the American Civil War of 1861, he, along with his brother the Duc de Chartres, volunteered into the Northern army and served for some time on the staff of General McClellan. On his return to Europe the following year he married his cousin the Princess Marie-Isabelle, eldest daughter of the Duc de Montpensier. After the Franco-German War he was admitted a member of the first national assembly. Under the expulsion bill (1886) he, along with the other princes, was forbidden to enter France. He published a *History of the Civil War* and a work on *English Trades-unions.*

Paris, Lamar co., Texas, 91 mi. w. of Texarcana. Railroads: St. L. & San F.; Texas & Pacific; Gulf of Colo. & S. Fé. Industries; flouring, saw, and planing mills, canning works, brickyards, foundry and machine shops, cotton gins, etc. Exports include cotton, live stock, grain, and fruits. Pop. 1900, 9,358.

Park, Mungo (1771–1806), African traveler, b. near Selkirk in Scotland. In 1793 he was engaged by the African Society to trace the course of the Niger. He reached the Gambia at the end of 1795, and advancing northeastward arrived at the Niger near Segu. He shortly returned, but in 1805 accepted command of a government expedition to the Niger. He arrived at Boussa, where he was attacked by the natives, and in his efforts to escape was drowned.

Parker, Alton Brooks (1852-), an American jurist, educated at the public schools, the Cortland Academy, Cortland Normal School, and the Albany Law School. After being admitted to the bar, he practiced in Kingston, and in 1877 became surrogate of Ulster County. In 1884, he was Delegate to the Democratic National Convention, and in the next year was tendered the office of first assistant postmaster-general. In the same year, he was chairman of the State Executive Committee, and shortly afterward was made a judge of the New York Supreme Court. In 1889, he was appointed a member of the Court of Appeals. In 1904, he was the Democratic nominee for President of the United States.

Parker, Francis Wayland (1837–1902), an American educator; b. at Bedford, N. H., Oct. 9, 1837; educated in the public schools and an academy. He entered the army as a private in 1861 and served during the Civil War. He was promoted several times and became colonel of the 4th N. H. volunteers. At the breaking out of the war Col. Parker was teaching in Illinois, and on retiring from the army resumed his former vocation. In 1875 he became superintendent of the public schools in Quincy, Mass. His work here soon gained for him a national reputation. In 1880 he took the presidency of the Cook County, Ill., Normal School, retaining the position until 1896. In 1898 he was chosen president of the Chicago Institute. In 1901, when the institute was consolidated with the University of Chicago, and became the School of Education, Col. Parker was retained as the head with the title of director. Col. Parker was opposed to all formalism, and discarded the old routine methods of teaching for what he termed the "Natural Method." He was the author of *Talks on Teaching*, *Quincy Methods*, *How to Teach Geography*, and numerous works on education.

Parker, Theodore (1810–1860), American divine, b. at Lexington, Mass. He studied at Harvard University, and in 1837 was settled as a Unitarian preacher at West Roxbury. Although his doctrine was accounted heterodox, yet such was his eloquence and ability that he soon became famous as a preacher and lecturer in New England. In 1843 he visited England, France, Italy, and Germany, and settled as a preacher in Boston on his return. He was a prominent advocate of the abolition of slavery. The principal of his published works are: *Occasional Sermons and Speeches*, and *Sermons on Theism, Atheism, and the Popular Theology.*

Parkersburg, Wood co., W. Va., on the Ohio River. Railroads: Baltimore & Ohio; Ohio River, and B. & O. Southern. Industries: chemical works, boiler shops, barrel and furniture factories, lumber and machine shops, and oil refineries. It has a large oil trade. Pop. 1900, 11,703.

Parkhurst, Dr. Charles H., b. in Massachusetts in 1842. He was graduated from Amherst College at the age of 24, and later he studied theology at Halle and Leipsic. He became pastor of the Congregational Church at Lenox, Mass, in 1874, and in 1880 went to New York City as pastor of the Madison Square Presbyterian Church. He became president of the Society for the Prevention of Crime, and in that capacity made a reputation as a social reformer. Among the books which he has published are, *The Blind Man's Creed* and *Our Fight with Tammany.*

Parkman, Francis (1823–1893), historian, was b. in Boston, Mass., graduated at Harvard in 1844, next studied law for two years, then traveled in Europe, and returned to explore the Rocky Mountains. The hardships he endured among the Dakota Indians seriously injured his health, yet in spite of this and defective sight Parkman worked his way to recognition as a historical writer on the period of rise and fall of the French dominion in America. He paid many visits to France to examine archives. His books are *The California and Oregon Trail* (1849), *The Conspiracy of Pontiac* (1851), *Pioneers of France in the New World* (1865), *The Book of Roses* (1866), *Jesuits in North America* (1867), *Discovery of the Great West* (1869), *The Old Régime in Canada* (1874), *Count Frontenac and New France under Louis XIV* (1877), and *Montcalm and Wolfe* (1884).

Parliament, the national assembly of the British nation, embracing two branches, the House of Lords and the House of Commons. It has borne this name since the thirteenth century, being the body which succeeded the Great Council of the Realm of the Angevin period, as the latter succeeded the Witenagemote of the Anglo-Saxon times. The English Parliament of to-day properly consists of three states or bodies—the clergy, the lords temporal, and the commons. Originally the clergy sat in the House of Commons (in person or by proxy), as well as in the House of Lords; but in modern times they sit in the latter only, as lords spiritual. Primarily the sovereign was considered a constituent element of Parliament, but the right has in modern times only been exercised by the signing or vetoing of bills (as by the American president), by virtue of being a part of the law-making power. The House of Lords is constituted, besides the clerical portion, of the hereditary peerage, and also of such peers as may be created by the crown. In 1890 there were 551 peers on the roll of the House

of Lords, of whom twelve were minors. More than one third of these peerages have been created by the crown during the present century.

The House of Lords is prohibited by the constitution of England, like the American Senate, from originating any measures providing for the appropriation of money, the Commons having the exclusive control of all legislation relating to the raising of revenue, even to a greater extent than our House of Representatives. The members of neither of the Houses of Parliament are allowed any compensation of any kind for their services.

The House of Commons consists of 670 members, viz., for England and Wales, 253 representatives of county constituencies (counties or divisions of counties), 237 of boroughs, and 5 of universities; for Scotland, 39 representatives of counties, 31 of burghs, and 2 of universities; for Ireland, 85 representatives of counties, 16 of boroughs, and 2 of a university.

The authority of Parliament extends over the United Kingdom and all its colonies and possessions. The period during which a parliament may sit is seven years, although instances are very rare in English history of a parliament sitting that long. A ministerial crisis generally causes a dissolution and an appeal to the people in the election of a new body. Whenever the minister is defeated in the House of Commons on a measure of vital importance (the House of Lords is not taken into consideration in such an event), the prime minister at once hands in his resignation to the sovereign, and the leader of the opposition is invited to form a cabinet, or "government," as it is termed, and generally the election of a new parliament is ordered.

There existed practically no parliament in England between 1461 and the middle of the reign of Henry VIII. It was the chronic struggle between the Parliament and Stuarts which led to the civil war and the beheading of Charles I. Parliament resumed its old and full power under William III. The Reform acts of 1832, 1867, and 1884, together with the Redistribution act of 1885, have materially modified and improved the statutes relating to the election of members of Parliament.

The Irish Parliament, whose independence was never fully recognized by England, was by the Act of Union of 1801 dissolved, and in consideration thereof it was provided that 28 Irish peers (elected for life) should sit in the House of Lords, and that 100 Irish members should be elected to the House of Commons.

Successive measures of reform, notably those of 1867 and 1884, have extended the franchise for voting for member of Parliament, until now all householders and £10 lodgers have that privilege. The colonies and dependencies of Great Britain have no direct representation in Parliament although colonial affairs occupy a large portion of its time and attention, and at times their agitation has caused changes of administration. The sessions of Parliament are held annually, usually from about the middle of February to the end of August, and are customarily closed by prorogation on the part of the crown.

Parma, a city of North Italy, capital of the province of Parma, on the small River Parma, 72 mi. s.e. of Milan. The principal squares are four, and one of them, the Piazza Grande, is large and handsome. Among the more important buildings are the cathedral, the baptistory, the church of La Steccata, the church of San Giovanni, and many others. Parma was originally an Etruscan town, and became a Roman colony in 183 B.C. The manufactures are of silk, cottons, woolens, felt hats, etc. Pop. 44,494. The province lies on the right bank of the Po; area 1,253 sq. mi.; pop. 277,842. It is watered chiefly by the Taro, the Parma, and the Enza, all of which fall into the Po.

Parma, DUCHY OF, formerly an independent state of Upper Italy, but since 1860 incorporated in the kingdom of Italy, and divided into the provinces of Parma and Piacenza. It comprehended the three duchies of Parma proper, Placentia or Piacenza, and Guastalla, and had an area of about 2,266 sq. mi. Parma anciently formed part of Gallia Cispadana and Liguria. Charlemagne made a present of it to the pope; but it subsequently became an independent republic, and in the sixteenth century was erected into a duchy which was long ruled by the Farnese dukes. The victories of the French in Italy in the beginning of this century enabled Napoleon to seize the duchy and attach it to his kingdom of Italy. After Napoleon's downfall it fell to his widow, the Archduchess Maria Louisa, for life, and thereafter to the Duke of Lucca.

Parnas'sus (or Liaku'ra), a mountain of Greece, situated in Phocis, 65 mi. n.w. of Athens. It has two prominent peaks, one of which was dedicated to the worship of Bacchus, and the other to Apollo and the Muses, while on its southern slope was situated Delphi and the Castalian fount. Its height is 8,068 ft., and a magnificent view is obtained from its top.

Parnell, CHARLES STEWART (1846–1891), b. at his father's estate of Avondale, county Wicklow, Ireland. He was educated at Magdalen College, Cambridge; became member of Parliament for Meath in 1875; organized the "active" Home Rule party, and developed its obstruction tactics; and in 1879 formally adopted the policy of the newly-formed Land League, was an active member of it, and was chosen president of the organization. In 1880 he was returned for the city of Cork, and was chosen as leader of the Irish party. In the session of 1881 he opposed the Crimes act and the Land act; was arrested under the terms of the former, along with other members of his party; and was lodged in Kilmainham Jail, from whence he was not released until the following May. In 1883 he was the recipient of a large money testimonial (chiefly collected in this country), and in this year was active in organizing the newly-formed National League. At the general election of 1885 he was re-elected for Cork, and next year he and his

followers supported the Home Rule proposals introduced by Mr. Gladstone, while he also brought in a bill for the relief of Irish tenants that was rejected. In 1887 he and other members of his party were accused by the *Times* newspaper of complicity with the crimes and outrages committed by the extreme section of the Irish Nationalist party. To investigate this charge a commission of three judges was appointed by the government in 1888, with the result that, after a great deal of evidence was heard on both sides, a report was laid before Parliament in February, 1890, Mr. Parnell being acquitted of all the graver charges.

Par'ody, a kind of literary composition, usually in verse, in which the form and expression of grave or serious writings are closely imitated, but adapted to a ridiculous subject or a humorous method of treatment.

Parole', a promise given by a prisoner of war that he will not try to escape if allowed to go about at liberty; or to return, if released, to custody at a certain time if not discharged, or not to bear arms against his captors for a certain period, and the like.

Pa'ros, an island in the Grecian Archipelago, one of the Cyclades, 4 mi. w. of Naxos; length 13 mi.; breadth 10 mi. It is generally mountainous; but the soil, though often rocky, is fertile, and in some places well cultivated. Its marble has been famous from ancient times, and is the material of which some of the most celebrated pieces of statuary are composed. Paros was the birthplace of the poet Archilochus and the painter Polygnotus. Parikia, a seaport on the northwest coast, is the chief village; pop. 2,200. Pop. of island 6,885.

Parrot, a name common to birds of the family Psittacidæ, of the order Scansores or climbers. The bill is hooked and rounded on all sides, and is much used in climbing. The tarsi are generally short and strong, the toes being arranged two forward and two backward. The tongue, unlike that of most other birds, is soft and fleshy throughout its whole extent. The wings are of moderate size, but the tail is often elongated, and in some cases assists in climbing. The plumage is generally brilliant. Parrots breed in hollow trees, and subsist on fruits and seeds, several species can not only imitate the various tones of the human voice, but also exercise in some cases actual conversational powers. Some live to a great age, instances being known of these birds reaching seventy and even ninety years. The species are numerous, and are known under the various names of parrots, parakeets, macaws, lorikeets, lories, and cockatoos, the name parrot, when used distinctively, being generally applied to species of some size, that have a strongly hooked upper mandible and a tail short or of medium length. They are natives of both tropical and sub-tropical regions. The best known species is the Gray Parrot of Western Africa, which can be most easily trained to talk. The Green Parrots are also common as domestic pets, being brought from the tropical regions of South America. The Carolina parrot is found in the U.S., and is gregarious in its habits.

The Gray Parrot.

Parry, Sir William Edward (1790-1855), b. at Bath. He joined the navy in 1803, became lieutenant in 1810, took part in the successful expedition up the Connecticut River in 1813, and continued on the North American station till 1817. In the following year he was appointed commander of the *Alexander* in an expedition to the Arctic regions under Sir John Ross, and during the succeeding nine years he commanded various expeditions on his own account in efforts to find a northwest passage, and to reach the north pole. He afterward filled various government situations, became rear admiral of the white, lieutenant governor of Greenwich Hospital, and received the honor of knighthood.

Parsees', the name given in India to the fire-worshiping followers of Zoroaster, chiefly settled in Bombay, Surat, etc., where they are among the most successful merchants. They have a great reverence for fire in all its forms, since they find in it the symbol of the good deity Ahurâ-Mazda (Ormuzd). To this divinity they have dedicated "fire temples," on whose altar the sacred flame is kept continually burning. Benevolence is the chief practical precept of their religion, and their practise of this finds its evidence in their many charitable institutions. One of the most curious of their customs is in the disposal of their dead. For this they erect what are called "towers of silence," built of stone, about 25 ft. high, and with a small door to admit the corpse. Inside is a large pit with a raised circular platform round it on which the body is exposed that it may be denuded of flesh by vultures, after which the bones drop through an iron grating into the pit below. The number of Parsees in India at last census was 72,065.

Parsley, a plant of the nat. order Umbelliferæ, one species of which, the common parsley, is a well-known garden vegetable, used for communicating an aromatic and agreeable flavor to soups and other dishes. It is a native of Sardinia.

Parsnip, a plant of which there are many varieties. It is tall, erect, with pinnate leaves and bright yellow flowers, common throughout England and in most parts of Europe and America, and much cultivated for its roots, which have been used as an esculent from a very early period.

Parsons, Labette co., Kan., on Big Labette River, 138 mi. s. of Kansas City. Railroads: M. K. & T. (six divisions); K. C. F. S. M. Industries: railroad shops, two flouring mills, iron foundry, coal miners' tools, drills, and handle factories. Surrounding country agri-

1. Rose-colored Parrot of Brazil and Mexico (Psittacula roseicollis).

2. Parrot of New Zealand (Nestor notabilis).

3. Arara, Australian Parrot (Sittace militaris).

4. Parrot of Alexandria (Palaeornis Alexandri).

5. Common flat-tailed Australian Parrot (Platycercus eximius).

1. White Parrot (Plictolophus Leadbeateri).

2. Gray Parrot (Psittacus erythacus).

Small Parrot of Australia (Melopsittacus undulatus).

4. Little Grass Parrots of Australia (Euphema pulchella).

5. South American Parrot (Chrysotis amazonica).

6. Parrot with wedge-shaped tail (Trichoglossus Novae-Hollandiae).

7. Parrot of the Carolinas (Conurus carolinensis).

cultural. The town was first settled in 1871, and became a city in 1873. Population, 1900, 7,682.

Parthenogen'esis, in zoology, a term applied to the production of new individuals from virgin females by means of ova, which are enabled to develop themselves without the contact of the male element. We find several examples of this peculiar phenomenon among insects. The most notable are the aphides or plant lice, whose fertilized ova, deposited in the autumn, lie without apparent development throughout the winter, and in the following spring produce modified females only. These females, without sexual contact with the males, give birth to a second generation like to themselves, and this form of reproduction is indefinitely repeated. In the succeeding autumn, however, male insects appear in the brood, and the ova are again impregnated with the male element. In this case parthenogenesis has more the appearance of alternate generation. Perhaps the truest instance of parthenogenesis is found in the unfertilized queen bee, which deposits eggs out of which male or drone bees are hatched. The eggs which produce neuters or females are impregnated in the usual way, but the eggs which produce the males are not fertilized. In the silkworm moth certain females, without fertilization, produce eggs from which ordinary larvæ are duly developed.

Par'thenon, a celebrated Grecian temple of Athena, on the Acropolis of Athens, one of the finest monuments of ancient architecture. It is built of marble, in the Doric style, and had originally 8 columns on each of the two fronts, with 17 columns on the sides, or 46 in all, of which 32 are still standing; length 228 ft., breadth 101, and height to the apex of the pediments 64 ft.; height of columns 34 ft. 3 in. The pediments were filled with large statues, the metopes adorned with sculptures in relief. After serving as a Christian church and as a mosque, it was rendered useless for any such purpose in 1687 by the explosion of a quantity of gunpowder which the Turks had placed in it during the siege of Athens by the Venetians. Though the more precious pieces of sculpture have been dispersed among various European collections, the Parthenon still bears an imposing aspect.

Parthia, in the widest sense, was the Parthian Empire, lying between the Euphrates, the Oxus, the Caspian Sea, and the Arabian Sea. In the narrowest sense Parthia was the small country formerly inhabited by the Parthians, and situated in the northwestern part of the modern Persian province of Khorasan. The Parthians were of Scythian origin, fought only on horseback, and were celebrated for their skill in archery. They were subject successively to Persians, Macedonians, and Syrians, and they resisted the Romans with various fortune.

Partick, a police burgh, Scotland, county of Lanark, on the Kelvin and the Clyde, adjoining Glasgow on the west. It has flour mills, engineering works, shipbuilding yards, etc. It gives name to a parliamentary division of Lanarkshire. Pop. 1891, 36,538.

Partnership is the association of two or more persons for the purpose of undertaking and prosecuting conjointly any business, occupation, or calling; or a voluntary contract by words or writing, between two or more persons, for joining together their money, goods, labor, skill, or all or any of them, upon an agreement that the gain or loss shall be divided in certain proportions among them, depending upon the amount of money, capital, stock, etc., furnished by each partner. Partnership may be constituted by certain acts connected with the undertaking apart from any deed or oral contract. The duration of the partnership may be limited by the contract or agreement, or it may be left indefinite, subject to be dissolved by mutual consent. The members of a partnership are called *nominal* when they have not any actual interest in the trade or business, or its profits; but, by allowing their names to be used, hold themselves out to the world as apparently having an interest; *dormant* or *sleeping*, when they are merely passive in the firm, in contradistinction to those who are active and conduct the business as principals, and who are known as *ostensible* partners. A partnership may be limited to a particular transaction or branch of business, without comprehending all the adventures in which any one partner may embark, but such reservation must be specified in the deed of contract. For in the usual course each member of a partnership is liable at common law for the debts of the firm, and a sleeping partner is responsible for all debts of the firm which have been contracted during his partnership. The powers of partners are very extensive, and the contract or other act of any member or members of the associated body in matters relating to the joint concern, is, in point of law, the contract or act of the whole, and consequently binding upon the whole, to the extent of rendering each liable for it individually as well as in respect of the partnership property. This power does not extend to matters extraneous to the joint concern. Partners, though they should act in a fraudulent manner as respects their copartners, bind the firm in all matters connected with its peculiar dealings.

Partridge, a well-known rasorial bird of the Grouse family. The common partridge is the most plentiful of all game birds in Britain, and occurs in nearly all parts of Europe, in North Africa, and in some parts of Western Asia. The wings and tail are short, the tarsi as well as the toes naked, and the tarsi not spurred. The greater part of the plumage is ash-gray finely varied with brown and black. They feed on grain and other seeds, insects, and their larvæ and pupæ, and are chiefly found in cultivated grounds. Besides this species there are the red-legged, French, or Guernsey partridge, which may now be found in considerable numbers in different parts of England; the Greek partridge, the African partridge, the Arabian partridge, the Indian partridge. The name partridge is applied in

a.—Common Partridge; *b*.—Red-Legged Partridge.

this country to several species of the genus *Ortyx* or quails.

Partridge Berry, a plant of the heath family, inhabiting North America, also known as wintergreen. The name is also applied to another North American shrub, a pretty little trailing plant with white fragrant flowers and scarlet berries, nat. order Rubiaceæ.

Parts of Speech are the classes into which words are divided in virtue of the special functions which they discharge in the sentence. Properly speaking there are only seven such classes, namely, the noun, adjective, pronoun, verb, adverb, preposition, and conjunction; for the article, which is usually classed as a separate part of speech, is essentially an adjective, while the interjection can hardly be said to belong to articulate speech at all.

Pasadena, Los Angeles co., Cal., east side of Arroyo Seco River, 10 mi. n.e. of Los Angeles. Surrounding country mostly fruit raising, principal products being lemons, oranges, apricots, peaches, prunes, etc. Railroads: Southern Pacific; Santa Fé; L. A. Terminal; and L. A. & P. Electric. Industries: sash, door, and mill work. The place was first settled in 1873, and became a city in 1896. Pop. 1900, 9,117.

Pascal, Blaise (1623–1662), a French philosopher and mathematician, b. at Clermont, in Auvergne. In 1647 he invented a calculating machine, and about the same time he made several discoveries concerning the equilibrium of fluids, the weight of the atmosphere, etc. He came under the influence of the Jansenists, Arnauld, and others, and from 1654 he lived much at the monastery of Port Royal, and partly accepted its rigorous rule, though he never actually became a solitaire. He afterward retired to a country estate, and finally returned to Paris, where he closed a life of almost unbroken ill-health.

Pas-de-Calais (pä-dē-kà-lā), a maritime department of Northern France; area 2,550 sq. mi. Its coast, extending about 80 mi., presents a long tract of low sand hills, but near Boulogna forms a lofty, crumbling cliff. The interior is generally flat, the streams and canals are numerous, and the soil fertile and well cultivated. The principal harbors are Boulogna and Calais. The chief minerals are indifferent coal, good pipe and potter's clay, and excellent sandstone. There are numerous iron foundries, glass works, potteries, tanneries, bleach works, mills, and factories of all kinds. The capital is Arras. Pop. 874,364.

Pasha, in Turkey, an honorary title originally bestowed on princes of the blood, but now conferred upon military commanders of high rank and the governors of provinces. There are three grades, each distinguished by a number of horse tails waving from a lance, the distinctive badge of a pasha. Three horse tails are allotted to the highest dignitaries; the pashas of two tails are generally the governors of the more important provinces; and the lowest rank, of one tail, is filled by minor provincial governors.

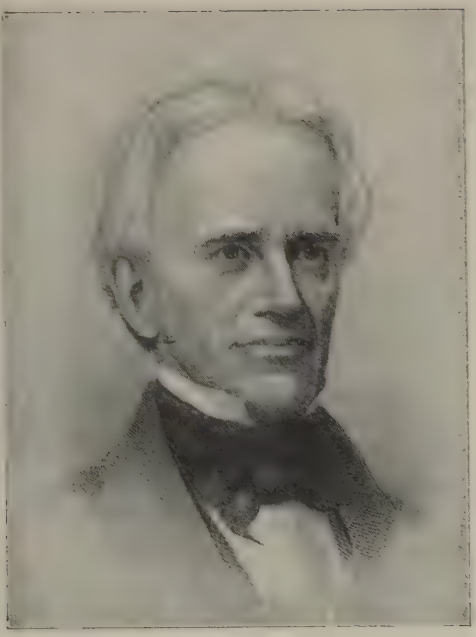
Passaic, Passaic co., N. J., on Passaic River, 12 mi. w. of New York. Railroads: Erie; Susquehanna; D. L. & W. Industries: worsted mill, iron foundry, five woolen mills, cotton mill, and about fifteen other factories. The town was first settled in 1684 and became a city in 1873. Pop. 1900, 27,777.

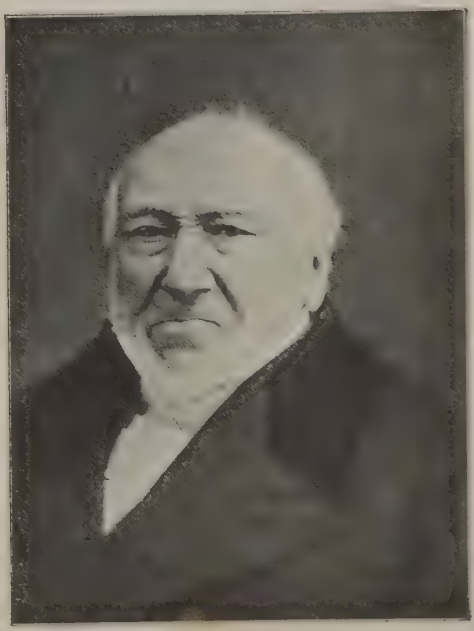
Passamaquod'dy Bay, a bay opening out of the Bay of Fundy, and lying between the state of Maine and New Brunswick. It is about 13 mi. long and 6 mi. wide, and is dotted with islands which make a safe harbor for the thriving town of Eastport.

Passenger Pigeon, a bird of the Pigeon family, which abounds in America. It is distinguished from the common pigeon chiefly by its long graduated tail. It is about 15 in. in length, with finely tinted plumage, small head, and long wings. The multiplication of these pigeons is so rapid, and their destructive power so great, that they are obliged to migrate from place to place in vast flocks to obtain their food. They fly in dense columns at a great height, and such a column, one mile broad and one hundred and forty miles long, has been observed. The larger breeding places are said to cover a forest area of about forty miles.

Passenger Pigeon.

Passengers.—In law the railway and other public carriers contract to carry passengers without any negligence on their (the carriers') part. In case of accident it lies on the carrier to show that it was from no fault or negligence on his part, or on the part of his servants, that the accident occurred. Hence all passengers injured (or in case of death their nearest relatives) have a claim for compensation, unless it





EDUCATORS AND PHILANTHROPISTS

Horace Mann
Peter Cooper

Thomas Arnold
Sir Moses Montefiore

Plate 27, Vol III

can be proved that the accident was due to the fault of the passenger. Passengers by sea are carried subject to the same general law as those by land; the carriers are bound to observe all due precautions to prevent accident or delay. No passenger ship having fifty persons on board, and the computed voyage exceeding eighty days by sailing vessels or forty-five by steamers, can proceed on its voyage without a duly qualified medical practitioner on board. In the case of imminent danger from tempest or enemies passengers may be called upon by the master or commander of the ship to lend their assistance for the general safety.

Passion Flower.

Passion Flower, a large genus of twining plants belonging to the natural order Passifloraceæ. They are all twining plants, often scrambling over trees to a considerable length, and in many cases are most beautiful objects, on account of their large, rich, or gaily-colored flowers, which are often succeeded by orange-colored edible fruits, for which indeed they are chiefly valued in the countries where they grow wild. See colored plate, Flowers.

Passion Plays (Miracle Plays or Mysteries), fantastic dramas founded on the historical incidents of the Old and New Testaments, and also on legends of the lives of saints. These were presented first in churches, and subsequently in the open fields or streets. The first we read of the performance of these plays was in the fourth century, supposedly introduced by Gregory Nazianzen; again, about 920. Hroswitha, a nun of Gandersheim, in Saxony, wrote six Latin plays on the *Lives of Saints;* then in 1110, 1183, and 1264 appeared miracle plays under the patronage of high dignitaries of the church. During the fifteenth and succeeding centuries they were immensely popular in England, Germany, and France. But in the later centuries there was mingled buffoonery with their representations to an extent which made them to a large degree scandalous. But there was one exception to the degeneration which characterized the presentation of the passion plays. In 1633, the inhabitants of a small village called Oberammergau, in the Bavarian highlands, made a vow in gratitude for the cessation of a plague which had desolated the adjacent vicinity, that they would perform every tenth year the *Passion of our Saviour*, a vow which has since been regularly and conscientiously observed. In 1870, 1880, and 1890 the play was given with great solemnity and effect. The leading wood carver of the village, a peasant of pure life and serene aspect, on those occasions personated the Saviour, and the effect was very impressive, all the other parts being appropriately represented without any approach to irreverence. But with the exception of this decennial rendition of the passion play at Oberammergau, its production may be said to be dying out in Europe, it being offensive to the general sense of propriety and reverence. Its proposed presentation in New York City a few years ago, was interdicted by the authorities, and no other effort has since been made to introduce it into this country.

Pas'sover, a feast of the Jews, instituted to commemorate the providential escape of the Hebrews in Egypt, when God, smiting the first-born of the Egyptians, *passed over* the houses of the Israelites, which were marked with the blood of the paschal lamb. It was celebrated on the first full moon of the spring, from the 14th to the 21st of the month Nisan, which was the first month of the sacred year. During the eight days of the feast the Israelites were permitted to eat only unleavened bread, hence the Passover was also called the "feast of unleavened bread." Every householder with his family ate on the first evening a lamb killed by the priest, which was served up without breaking the bones. The passover was the principal Jewish festival.

Passport, a warrant of protection and authority to travel, granted to persons moving from place to place, by a competent authority. In some states no foreigner is allowed to travel without a passport from his government, and in all cases the visitor to the continent of Europe is wiser to provide himself with one, if only as a means of identification. In Russia and Turkey in particular, a passport is indispensable. In the U. S. passports, with description of the applicant, are issued by the State Department at Washington. They are good for two years from date, renewable by stating the date and number of the old one. The fee required is one dollar. They are issued only to citizens, native-born and naturalized.

Pasteur (pȧs-*teur*), Louis (1822–1895), French chemist and physicist, b. at Dole, Jura, educated at Jena University, and the Ecole Normale, Paris, where in 1847 he took his degree as doctor. The following year he was appointed professor of physics in Strasburg, where he devoted much research to the subject of fermentation; in 1857 he received the appointment of dean in the Faculty of Sciences, Lille; in 1863 he became professor of geology, chemistry, and physics at the Ecole des Beaux-Arts, Paris; and in 1867 professor of chemistry at the Sorbonne. He became a member of the French Academy in 1882. He was especially successful in proving the part played by microbes in fermentation and decomposition, in introducing a successful treatment of disease in silkworms and cattle, and has achieved great success in his efforts to

check hydrophobia by means of inoculation. Since 1886 the center of his work has been at the Pasteur Institute in Paris. His work was at first chemical. Following up well known researches by Arago, Biot, and Mitscherlich, Pasteur discovered the facets on tartrate crystals and what are called left-handed tartrates. He also propounded the theory that "molecular dissymmetry"—supposed to be expressed in the power which solutions of some organic substances have of causing a beam of polarized light to rotate—was characteristic of living matter and its products.

It is said that a German manufacturer of chemicals noticed that impure tartrate of lime fermented when dissolved and exposed in the sun, and that this prompted Pasteur to an investigation, the result of which was the discovery of a living ferment—a micro-organism comparable in its powers to the yeast-plant which Cagniard-Latour and Schwann had discovered in alcoholic fermentation. Pasteur was further able to show that the little organism would, in a solution of paratartrate of ammonia, select for food the "right-handed" tartrates alone, leaving the "left-handed," although the difference between these is merely physical not chemical. Having got hold of a clue, Pasteur went on to show that other fermentations—lactic, butyric, acetic—are essentially due to organisms. He was naturally led to corroborate and extend Schwann's researches on putrefaction, which is also due to micro-organisms, and this path of investigation enabled him to make important practical suggestions in regard to the making of vinegar and the prevention of wine disease, as also to correct insufficiently careful experiments which were leading many to believe that spontaneous generation was demonstrable.

Prompted by his illustrious master Dumas, Pasteur next (1865) directed his inquiries to those diseases of silkworms by which the silk industry in France had been almost ruined. It is said that he had never before even seen a silkworm, though he knew the supposed disease germs which had been demonstrated by previous investigations in the insect's blood. These he traced from egg to larva, from chrysalis to moth; and, as the pébrine disease is distinctly manifest in the adults, though it may be hidden in the young, the practical conclusion was plain that unhealthy moths should be rejected, and that all precautions should be taken to prevent infection. But Pasteur's work on the diseases of silkworms overstrained him, and in 1868 he was laid aside by paralysis. Soon, however, he was at work again, investigating beer, as he had investigated wine, detecting the intruders which sometimes interfere with the life of the yeast plant and spoil the brew. His researches began to come yet closer to human life, for he attacked the problem of splenic fever, the bacillus of which had been discovered by Davaine (1863), and skillfully traced from stage to stage by Koch (1876). Of Pasteur's investigations in this connection, that by which he showed that birds were not liable to fall victims to splenic fever, because the temperature of their blood is too high for the prosperity of the germ, may serve as a characteristic illustration. Passing from splenic fever to fowl cholera, Pasteur showed that it was possible to attenuate the virulence of injurious micro-organisms by exposure to air, by variety of culture, or by transmission through various animals. He thus "tamed" the bacillus of splenic fever, and demonstrated that sheep and cows "vaccinated" with the attenuated bacilli were protected from the evil results of a subsequent inoculation with the virulent virus. Pl. 17, Vol. II.

Pastor, a genus of birds belonging to the starling family, found in the north of Africa,

Pastor.

Syria, and India. The rose-colored pastor (*P. roseus*) is a favorite song bird.

Pastoral Poetry, poetry which deals, in a more or less direct form, with rustic life. It has generally flourished in highly corrupted artificial states of society. Thus it was that Theocritus, the first pastoral poet, made artistic protest against the licentiousness of Syracuse, and Vergil wrote his *Bucolics* and *Eclogues* in the corrupt Roman court. In the sixteenth century pastoral poetry received its most notable expression in the *Arcadia* of G. Sannazaro, the *Aminta* of Tasso, and the *Pastor Fido* of Guarini. This tendency, which was so potent in Italy, spread to England, and influenced the *Shepherd's Calendar* of Spenser, the *Arcadia* of Sidney, the *Faithful Shepherdess* of Fletcher, *As You Like It* of Shakespeare, and the *Comus* of Milton. The *Gentle Shepherd* of Allan Ramsay (1725) was the last successful dramatic pastoral.

Patago'nia is the name applied to that extreme portion of South America which is bounded e. by the Atlantic, w. by the Pacific, s. by the Strait of Magellan, and n. by the Rio Negro. Since 1881 this large territory has been, by treaty, divided between Chile and the Argentine Republic, so that the portion west of the Andes (63,000 sq. mi.) belongs now to the former, and the portion east of the Andes (360,000) belongs to the latter. The Straits of Magellan form a southern boundary of 360 mi., and separate the mainland from the innumerable islands of Terra del Fuego. Here the Chilean government has established the settlement of Punta Arenas, with stations along the coast. Patagonia east of the Andes

consists mainly of vast undulating plains, frequently covered with shingle and broken up by ridges of volcanic rock. The vegetation is scanty, except in the region adjoining the Andes, and in many places there are shallow salt lakes and lagoons. The chief rivers are the Rio Negro, the Chupat, the Rio Desire, and the Rio Chico, all of which have their sources in the Andes, and run eastward. There are few if any good seaports. The Patagonians are a tall, muscular race averaging fully 6 ft. in height, with black hair, thick lips, and skin of a dark brown color. They are a nomad race, divided into numerous tribes, whose chief occupation is in hunting and cattle breeding. This native population, however, never numerous, is rapidly disappearing. Colonization is encouraged by the Argentine government, and there are many tracts suitable for European settlement. The country was first discovered by Magellan in 1520.

Patchou'li, a perfume obtained from the dried leaves and branches of the *Pogostēmon patchouli*, a labiate plant of India and China, where it is cultivated on a large scale. It is used in India to scent costly Cashmere shawls, tobacco, and hair oil, and is everywhere valued as a preservative of woolens and linens from insects.

Pat'ent, a privilege from government granted by letters patent, conveying to the individual or individuals specified therein the sole right to make, use, or dispose of some new invention or discovery for a certain limited period. Before the Declaration of Independence patents were occasionally issued by the colonial governments; and the constitution of the U. S. expressly vested in Congress powers "to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." The Congress of 1790 passed an act regulating the issue of patents for inventions, requiring the would-be patentee to petition the secretary of state, the secretary of war, or the attorney general; with the approval of any two of these the description of the patent was certified by the attorney general, and the president directed the issuing of the patent. The patent was recorded in the office of the secretary of state, and delivered to the patentee under the great seal of the U. S. Under this law, which remained practically unchanged till 1836, patents were granted with little examination, and the responsibility of deciding whether the patentee had made out his case was left wholly to the courts — a system found to be inconvenient and unsatisfactory for the interests of the public. On occasion of a fire at the Patent Office, when many of the documents were destroyed, Congress repealed former acts and established a new system, which remains in force till now. Patents are granted for a period of seventeen years. The Patent Office is attached to the department of the secretary of the interior. The commissioner, assistant commissioner, and three examiners-in-chief are appointed by the president, with the consent of the Senate. The chief clerk, a staff of a hundred examiners (principal, first assistants, second assistants, third assistants), draughtsmen, copyists, attendants, etc., are nominated by the commissioner of patents and approved by the secretary of the interior. The office publishes pamphlets on *The Patent Laws and Laws relating to the Registration of Trade-marks and Labels*, and *The Rules of Practise in the U S. Patent Office*, which may be had on application. The number of patents issued in the U. S. greatly exceeds that of any other country. In 1837–46 the number was 5,019: in 1847–56 it was 12,578; in the decade 1877–86 it was 169,478; in the century ending April 10, 1890, nearly 437,000 grants were made.

Paterson, Passaic co., N. J., on Passaic River, 20 mi. n.w. of New York. Railroads: Erie; D. L. & W.; N. Y. S. & W. Industries: over a hundred silk mills, woolen, rolling, and flour mills, flax, jute, linen thread, shirt, silk accessories, velvet, tapestry, twilling, braid, and engine factories. Until 1865 was the center of the American cotton industry; now the largest silk center of the world. The town was first settled in 1792 and became a city in 1851. Pop. 1900, 105,171.

Paterson, William (1665–1719), financier and founder of the Bank of England, was b. in Dumfriesshire. He went through England as a peddler, settled for a time at Bristol, subsequently resided in the Bahama Islands. Returning to London he engaged in trade with success, and in 1694 proposed and founded the Bank of England, being one of its first directors. Before this time he had conceived the project of founding a free emporium of trade in Darien, and in 1695 he obtained the sanction of a Scottish act of Parliament constituting the Darien Company. After the failure of this great scheme he returned to England, broken in health and fortune. When the Treaty of Union between England and Scotland was concluded in 1707, Paterson, who was one of its warmest advocates, after much difficulty received an indemnity of $90,000 for the losses he had sustained.

Patia'la, an Indian native state in the jurisdiction of the Punjab government, the larger part of which is situated south of the Sutlej and the other part in the hill country near Simla; area 5,887 sq. mi. Besides the usual agricultural products, the state has slate, lead, marble, and copper mines. The Mahárája of Patiala has been of service to the British government on several critical occasions, such as the mutiny of 1857, and for this loyalty he has been rewarded by an increase of territory. Pop. of the state, 1,467,433. The capital is Patiala, 130 mi. s.e. of Amritsir. It was founded in 1752 by Sardar Ala Singh, and has a pop. of 53,629.

Patmos, an island of Turkey in Asia, in the Grecian Archipelago, about 26 mi. s.s.w. of Samos; greatest length, 12 mi.; breadth, nearly 6. The island is an irregular mass of barren rock, agricultural products are scanty, and the population find their chief occupation in fishing. Near the excellent natural harbor of La

Scala is the small town Patmos, overlooked by the old monastery of St. John, in a grotto of which, it is said, the apostle John saw his apocalyptic visions. Pop. about 4,000.

Patna, a city of Hindustan, in the lieutenant-governorship of Bengal, situated on the Ganges near its junction with the Son and the Gandak, and about 400 mi. n.w. from Calcutta. It extends for nine miles along the river, from which its tombs, mosques, and monuments present a fine appearance. On the west side is the suburb of Bankipur, where the government offices and European residences are situated. By reason of its central position and natural advantages the city is an important business center, and the chief seat of the opium trade. Pop. 170,654. The district of Patna has an area of 2,079 sq. mi., for the most part flat and exceedingly fertile. The staple crop is rice, and other products are wheat, barley, cotton, tobacco, and sugar corn. Pop. 1,756,856.

Paton, Sir Joseph Noel, a historical painter, was b. at Dunfermline in 1821. He studied for some time at the Royal Academy; attracted attention by his outline etchings illustrative of Shakespeare and Shelley; exhibited his first picture of *Ruth Gleaning* at Edinburgh in 1844; gained one of three premiums at Westminster competition by his fresco of the *Spirit of Religion*, and a prize of $1,500 by his paintings, *Christ Bearing the Cross* and *The Reconciliation of Oberon and Titania.* During subsequent years he has produced many pictures, well known by engravings, such as *The Pursuit of Pleasure*, *Home*—a soldier's return from the Crimea, *In Memoriam*—a scene from the relief of Lucknow, *Mors Janua Vitæ*, *Faith and Reason*, *Lux in Tenebris*, *The Man with the Muck Rake*, etc. He has also published two volumes of verse.

Patriarchs are the antediluvian heads of families, and the three fathers of the Hebrew race, Abraham, Isaac, and Jacob. The term at a later period became the title of the presidents of the sanhedrim, which exercised a general authority over the Jews of Syria and Persia after the destruction of Jerusalem. From them the title was adopted by the Christians, who applied it, from the beginning of the fifth century, to the bishops of Rome, Constantinople, Alexandria, Antioch, and Jerusalem. The patriarch of Rome became the supreme pontiff of the West, the four heads of the Eastern Church preserving the title of patriarch. The patriarch of Constantinople is the primate of the Greek Church in the Ottoman Empire, and bears the title of *œcumenical.*

Patrick (Patricius), St. (396–469), the apostle of Ireland, was b. in the British Roman province of Valentia, probably at Nemthur on the Clyde where Dumbarton now is. Having been ordained a bishop and received the papal benediction from Celestine I, he went over to Ireland about the year 432. Here he is said to have founded over 360 churches, baptized with his own hand more than 12,000 persons, and ordained a great number of priests.

Patrick, St., Order of, an Irish order of knighthood, instituted in 1783 by George III, originally consisting of the sovereign, the lord lieutenant of Ireland for the time being, and fifteen knights; but by a statute in 1833 the order was enlarged and the number of knights raised to twenty-two. The badge of the order is of gold, oval in shape, with the cross of St. Patrick surmounted by a shamrock in the center, and round this is a blue, enameled band bearing the motto, "Quis separabit." The badge is suspended to a collar of roses and harps by means of an imperial crown and gold harp. The mantle and hood are of sky-blue tabinet, lined with white silk.

Pa'tron, in the Roman Republic, a patrician who had plebeians, called *clients*, under his immediate protection, and whose interests he supported by his authority and influence. In later times the term patron was applied to every protector or influential promoter of the interests of others; hence the saints who were believed to watch over the interests of particular persons, places, or trades were called *patron saints.*

Patti, Adelina Maria Clorinda, opera singer, was b. at Madrid in 1843; received her musical training from her brother-in-law, Maurice Strakosch; made her first appearance in New York in 1859 as Lucia; and in 1861 made a brilliant début at Covent Garden, London, in the parts of Amina, Violetta, Zerlina, and Martha. Since then she has fully established her reputation as an artiste in the chief cities of America and Europe. In 1868 she married the Marquis de Caux, from whom in 1883 she obtained a divorce. Subsequently she married Signor Nicolini. Pl. 21, Vol. III.

Pau (pō), a town of France, capital of the department of Basses-Pyrenees, formerly of Béarn, picturesquely situated on a height above the right bank of the Gave-de-Pau, in view of the Pyrenees (10 mi. distant), and 58 mi. e.s.e. of Bayonne. The most interesting edifice is the castle in which Henry IV was born, crowning a rising ground and overlooking the Gave-de-Pau. It is a large irregular structure, flanked with six square towers. The oldest part is supposed to date from 1363, and the whole is well preserved. Pau is a favorite winter resort, enjoying a mild, dry climate and a peculiar stillness of the atmosphere, with no sudden variations of temperature. Pop. 25,879.

Paul, the apostle, commonly called Saint Paul, was b. of Jewish parents at Tarsus, in Cilicia. He went to Jerusalem to study under Gamaliel, one of the most celebrated Jewish rabbins. Thus prepared for the office of teacher, he joined the sect of the Pharisees, and became a persecutor of the Christians. He was present at and encouraged the stoning of Stephen, and it was only when he was overtaken by a vision on his way to Damascus that he became a convert to Christianity. Arabia, Syria, Asia Minor, Greece, and the islands of the Mediterranean were the scenes of his labors. The churches of Philippi in Macedonia, of Corinth, Galatia, and Thessalonica, honored

him as their founder; and he wrote epistles to these churches, and to the churches in the chief cities of Greece and Asia Minor. He went to Jerusalem, and was there arrested and brought to Cæsarea, where he was kept a prisoner for two years by the Roman governors Festus and Felix. He appealed, as a Roman citizen, to the emperor; and on his way to Rome, where he arrived in the year 62, he was shipwrecked on the island of Melita. According to the tradition of the early church he suffered martyrdom during the reign of Nero.

Paul, the name of five popes. PAUL I, pope from 757–767, brother of Stephen II, stood on good terms with Pepin and Charlemagne. PAUL II, pope from 1464–71, a native of Venice, originally called Pietro Barbo, caused a crusade to be preached against the Hussites. PAUL III, pope from 1534–49, formerly Alessandro Farnese, was a zealous defender of the Church and did much to suppress heresy. Among the important events of his position were the publication of a brief condemning slavery, the excommunication of Henry VIII of England, the approval of the Order of Jesuits and the convocation of the Council of Trent. He was a great patron of art and appointed Michelangelo architect in chief of the Vatican and St. Peter's. PAUL IV, Pope from 1555 to 1559, joined France in the war for the conquest of Naples (1555-57). PAUL V was Pope from 1605 to 1621. His pontificate was marked by the interdict laid on Venice and the establishment of the Congregation of the Oratory and of the Ursuline and Visitation.

Paul I (1754–1801), emperor of Russia, son of Peter III and Catherine II. On the death of Catherine in 1796 he succeeded to the throne. He put an end to the war with Persia, and liberated the Poles who were in confinement in Russia. He joined the coalition of crowns against France, but afterward favored the cause of Napoleon. Paul caused himself to be declared Grand-master of the Knights of Malta (1798), but Britain, having conquered the island in 1800, refused to surrender it to the Russian emperor. He therefore laid an embargo on all British ships in the Russian ports, and prevailed upon the Swedish, Danish, and Prussian courts to enter into a convention against Great Britain.

Paulding, JAMES KIRKE (1779–1860), miscellaneous writer, b. in Dutchess co., N. Y. He removed to New York, where he became intimately acquainted with Washington Irving, and published in connection with him a series of humorous and satirical essays, entitled *Salmagundi.* For some years he was secretary of the U. S. navy. He published a second series of *Salmagundi,* entirely his own composition; several novels, among which are *Königsmarke;* and the *Dutchman's Fireside;* a *Life of Washington;* and many political pamphlets, poems, etc.

Pauncefote, JULIAN, LORD (1828——), an English statesman and diplomat; b. at Munich, Sept. 13, 1828; educated at Paris, Geneva, and Marlborough College. He was admitted to the bar in 1852. In 1875 he was appointed Attorney-General at Hongkong, and acted as judge of the supreme court in 1869 and again in 1872. He was knighted in 1874, and two years later became Under Secretary of Foreign Affairs. In 1888 Sir Julian succeeded Lord Sackville West as British Minister at Washington, and in 1893 was raised to the rank of Ambassador and Minister Plenipotentiary. His greatest diplomatic success has been the completion with Secretary of State Hay of the treaty regulating the construction of a trans-isthmian canal. He has always used his influence to promote a friendly feeling between the two countries. See *Hay-Pauncefote Treaty.*

Pavement, a floor or covering consisting of stones, blocks of wood, etc., laid on the ground in such a manner as to make a hard and convenient roadway. Pavements of lava, with elevated sidewalks, are found in the ancient Roman cities of Herculaneum and Pompeii, and the paving of important highways was practised by the Romans. Of modern cities Paris is generally mentioned as having the oldest pavement. Street pavements in modern cities are usually of stone, asphalt, concrete, or wood. The stone commonly used for the carriage way is granite, blocks of which are placed upon a solid bed of concrete, and the interstices filled with sand and grouted with asphalt, lime, or cement. Arbroath and Caithness supply the best paving stones for sidewalks. Concrete pavement is composed of broken stone, etc., mixed with Portland or other cement or asphalt. Val de Travers *asphalte rock* is now commonly used for pavements. Wood pavements have the advantage of being noiseless, but the abrasion of the surface requires frequent repair. They are laid in different ways, but the blocks which form the pavement are always placed on their ends, so that the cross surface of the wood is exposed. The spaces between the blocks are usually filled with gravel, upon which hot tar or pitch is poured.

Pa'via, a city of Italy, in Lombardy, 22½ mi. from Milan, on the left bank of the Ticino, capital of a province of the same name. Pavia is still partly surrounded by old walls and fortifications. Of edifices the most important are the cathedral; the church of San Michele; the Castello, or castle, now a barrack; the university; the Collegio Borromeo; etc. The manufactures are unimportant. About 4 mi. to the north is the famous Carthusian monastery Certosa di Pavia. Pavia was a place of considerable importance during the reign of Augustus. It afterward came into the possession of the Lombard kings, who made it their capital. It was latterly under the Milanese. Pop. 29,836. The province, which extends on both sides of the Po, has an area of 1,285 sq. mi., partly covered by the Apennines. Pop. 496,832.

Pawnbrokers, persons who lend money on goods *pledged* or deposited with them at a legally fixed rate of interest, and under the restriction of a government license. Although this mode of borrowing is occasionally taken advantage of by all classes, and bankers, when they accept security for their advances, act on

the same principle as the pawnbroker, the business, as a special one, originates chiefly in the necessities of the poor. In the Middle Ages lending upon pledges was a trade almost exclusively pursued by Jews and Lombards. On the European continent this form of borrowing is partly conducted by charitable institutions called Monts de Piété. In England pawnbrokers were recognized by statute in the reign of James I. The business is regulated by statutes in each of the states.

Pawtucket, Providence co., R. I., on Pawtucket River, 4½ mi. n.e. of Providence. Railroads: Providence & Boston; N. Y. N. H. & H.; Old Colony. Water power is furnished by the falls in the river at this point. Industries: immense thread works, employing 2,200 hands, cotton mills, producing 20,000,000 yards of calico yearly, wadding, plush, braid, bleaching and dyeing works, woolen mills, machinery, leather, rope, spool, and file factories, and steam fire engine works. Exports include coal, lumber, brick, cement, etc. Population, 1900, 39,231.

Paxton, Sir Joseph (1803–1865), landscape gardener and architect, b. in Bedfordshire. He was educated at the free school of Woburn; became gardener, and latterly estate manager to the Duke of Devonshire, at Chatsworth, in Derbyshire; designed the crystal palace for the great International Exhibition (London) in 1851, and soon after was knighted. He was elected member of Parliament for Coventry in 1854, and continued to represent it until his death.

Paymaster, an officer in the army and navy, from whom the officers and men receive their wages, and who is intrusted with money for that purpose. In matters of general discipline the paymaster is subordinate to the commanding officer of his regiment; but in regard to the immediate duties of his office he is directly responsible to the war office. The paymaster of a ship in the navy has a general charge of the financial department in the vessel.

Payne, Henry B. (1810–1896), b. in New York. He was educated at Hamilton College, New York, and later he practised law at Cleveland, O. In 1849 he was elected state senator of Ohio. He was elected to Congress in 1875, and U. S. senator from Ohio in 1885.

Payne, Henry C. (1843-1904), an American politician, born at Ashfield, Massachusetts. He removed to Milwaukee, Wisconsin, in 1863, and soon became interested in public affairs, serving consecutively as secretary and chairman of the Republican County Committee, secretary and chairman of the Republican State Central Committee, and member of the Republican National Committee (1880). From 1876-86 he was postmaster in Milwaukee. In 1888-92 he was a delegate to National Republican Conventions. Subsequently, he held a number of city offices, and in 1893-95 was receiver of the Northern Pacific Railroad. In 1902 he was appointed Postmaster-General of the United States, and served in that capacity until his death in 1904.

Peabody, George (1795-1869), philanthropist, b. at Danvers, Mass. In 1837 he went to London and established the firm of George Peabody & Co., exchange brokers and money lenders. Having acquired a large fortune he gave $200,000 to establish a free library in his native town; presented $1,000,000 to found a free library and institute of art and science at Baltimore; and in 1862 placed $750,000 in the hands of trustees for the benefit of the poor of London, to be employed in building model dwelling houses. He afterward added $1,750,000 to this benefaction. In 1866 he made a gift of $2,100,000, afterward increased to $3,500,000, for the cause of education in the South.

Peabody, Essex co., Mass., 16 mi. n.e. of Boston. Railroad, Boston & Maine. Seat of Peabody Institute. Leather manufacture is the chief industry. Pop. 1900, 11,523.

Peace Congress at The Hague. The Peace Congress which assembled at The Hague, Holland, on May 18, 1899, was called by Czar Nicholas II of Russia. On August 24, 1898, he caused a note to be sent to the foreign diplomats at St. Petersburgh, pointing out the necessity of a general convention for discussing the maintenance of peace throughout the world and the general disarmament of nations. The note, which was sent by Count Muravieff, is as follows;

"The maintenance of peace and the possible reduction of the excessive armament which weigh upon all nations present themselves in existing conditions to the whole world as an ideal toward which the endeavors of all governments should be directed. The humanitarian and magnanimous ideas of his majesty the emperor, my august master, have been won over to this view in the conviction that this lofty aim is in conformity with the most essential interests and legitimate views of all the powers; and the imperial government thinks the present moment would be very favorable to seeking the means. International discussion is the most effectual means of insuring all people's benefit—a real durable peace, above all, putting an end to the progressive development of the present armaments. In the course of the last twenty years the longing for general appeasement has grown especially pronounced in the consciences of civilized nations, and the preservation of peace has been put forward as an object of international policy. It is in its name that great states have concluded between themselves powerful alliances.

"It is the better to guarantee peace that they have developed in proportions hitherto unprecedented their military forces and still continue to increase them without shrinking from any sacrifice. Nevertheless, all these efforts have not yet been able to bring about the beneficent result desired — pacification. The financial charges following the upward march strike at the very root of public prosperity. The intellectual and physical strength of the nation's labor and capital are mostly diverted from their natural application and are unproductively consumed. Hundreds of millions are devoted to acquiring terrible engines of destruction, which, though to-day regarded as the last word of science, are destined

to-morrow to lose all their value in consequence of some fresh discovery in the same field. National culture, economic progress, and the production of wealth are either paralized or checked in development. Moreover, in proportion as the armaments of one power increase, they less and less fulfill the object the government has set before themselves.

"The economic crisis, due in great part to the system of armament *a l'outrance* and the continual danger which lies in this massing of war material are transforming the armed peace of our days into a crushing burden which the people have more and more difficulty in bearing. It appears evident that if this state of things were to be prolonged it would inevitably lead to the very cataclysm it is desired to avert, and the horrors whereof make every thinking being shudder in advance. To put an end to these incessant armaments and to seek the means of warding off the calamities which are threatening the whole world—such is the supreme duty to-day imposed upon all states. Filled with this idea, his majesty has been pleased to command me to propose to all the governments whose representatives are accredited to the imperial court the assembling of a conference which shall occupy itself with this grave problem.

"This conference will be, by the help of God, a happy presage for the century which is about to open. It would converge into one powerful focus the efforts of all states sincerely seeking to make the great conception of universal peace triumph over the elements of trouble and discord, and it would, at the same time, cement their agreement by a corporate consecration of the principles of equity and right, whereon rest the security of states and the welfare of peoples."

This radical proposition was the subject of universal discussion. By some it was received with the highest approval, by others it was regarded as desirable but unattainable, while others condemned it as absurd. However, the sincerity of the Russian emperor was not questioned in this matter, and steps were at once taken by the various governments to appoint representatives to the conference. The questions which should come before this congress were much discussed. Since all the troubles to which nations are heir might be discussed in such a body, limitations began to be set and the questions which the consensus of opinion decided were proper for discussion were mainly as follows:

First and foremost was the proposition not to increase the naval or military forces for a fixed period; secondly, the question of reducing the forces and appropriation for the same in the future; on account of the continued improvement of the firearms and engines of war in general which render useless to-day what was yesterday considered the greatest armament possible, it was proposed to interdict the use of any new weapon of a power fuller than those now in use. In fact, it was considered advisable to forbid the employment of some of the contrivances as submarine torpedoes that are now in use. It was proposed also to formulate a declaration concerning the laws and customs of war. One of the foremost proposals was a declaration of the principles of mediation and arbitration in all cases.

The congress was invited by Queen Wilhelmina of The Netherlands to meet at The Hague, and the invitation was accepted. The congress met May 18, 1899, and was received with every mark of respect by the government of The Netherlands. In view of the great world questions which were to come before this congress each nation sent as delegates some of its greatest thinkers and diplomats. The conference was organized as by previous understanding with M. de Staal, the Russian ambassador to Great Britain, as president. The nations represented were the six great European powers and some eight smaller European states, four Asiatic governments, and the United States. The four Asiatic powers were China, Japan, Persia, and Siam. The conference immediately appointed committees and sub-committees upon the various lines of work outlined, and these committees immediately went into secret session to receive the various propositions to be offered by the representatives, and to report upon the same to the general committees and to the general congress.

The general conference met every few days to hear and consider the reports of the various committees.

On the 29th of July the congress was brought to a close and the signatures of the various documents took place.

Although the conference was summoned by the Russian Emperor primarily to discuss disarmament the delegates ignored the main object and gave their attention more to mediation and arbitration.

In regard to disarmament the delegates contended themselves with a declaration as to the desirability of an arrest in the increase of the armaments.

Convention No. 1, as signed by the delegates, forbids (1) the use of balloons to drop explosives from the sky to injure combatants; (2) the use of asphyxiation shells; and (3) the use of expanding bullets. The American and English delegates declined to sign the second and third clauses of this agreement.

Convention No. 2 applied the provisions of the Geneva convention to naval warfare. [See *Geneva Convention.*]

Convention No. 3 embodied a perfected code of the rules of war based on the Brussels rules. [See *International Law.*]

Convention No. 4, the great achievement of the conference, makes mediation an international duty and provides for the establishment of a permanent court of arbitration with a bureau at The Hague. It also makes it the duty of all governments to encourage the submission of disputes to the court and provides for the elaboration of a complete code of arbitration procedure.

Arbitration and Mediation Treaty.—Convention No. 4 in the form of a treaty was sub-

mitted to the United States Senate by President McKinley December 20, 1899, and ratified by that body February 5, 1900. It had been signed at The Hague in July, 1899, by the American representatives, Andrew D. White, Stanford Newel, Seth Low, Capt. Wm. Crozier, Capt. A. T. Mahan, and F. W. Holls. On account of the extreme importance of this treaty and the universal interest in it we present a summary of each of the articles.

The treaty embraces two stipulations: first, as to mediation; second, as to arbitration. It comprises fifty-seven articles, and as far as the United States is concerned, a special proviso specifying this country's adherence to the Monroe Doctrine.

The four titles of the treaty are as follows:—

Title first — The maintenance of general peace.

Title second — Of friendly offices of mediation.

Title third — Of international commissions of inquiry.

Title fourth — Of international arbitration.

Chapter I.— Of arbitral judgment.

Chapter II.— Of the permanent court of arbitration.

Chapter III.— Of the arbitral procedure.

The treaty is too long to print in full in this book. The following is a careful summary of the provisions of the convention:—

Title First.— The Maintenance of General Peace.

Art. 1. The signatory powers agree to use all their efforts to prevent as much as possible the recourse to force, in the relations between states.

Title Second.— Of Friendly Offices and Mediation.

Art. 2. In case of dissension or conflict, the powers agree to have recourse to the friendly offices or to the mediation of one or more friendly powers.

Art. 3. One or more of the powers which have no part in the conflict may offer their friendly offices or mediation to the states in conflict, the offer not to be considered an unfriendly act.

Art. 4. The duty of a mediator was to conciliate the opposing claims and appease the resentment.

Art. 5. The duties of a mediator cease whenever it is officially declared by either party to the strife, or by the mediator himself, that the methods of conciliation proposed are not accepted.

Art. 6. Friendly offices and mediation have solely the character of advice, and are never binding.

Art. 7. The acceptance of mediation will not have the effect, in the absence of an agreement to the contrary, to stop preparations for war, nor in case the conflict is in progress, to interrupt the same.

Art. 8. In case of threatened war, the states in conflict will each choose a power to which they will confide the duty of negotiating with the power chosen by the other side, for the purpose of preventing the breaking off of peaceful relations. The term of such negotiation shall not exceed thirty days. In the meantime the principals will attempt no negotiation. In case the mediating powers can not prevent war, they are to use all means to re-establish peace.

Title Third.— Of International Commissions of Inquiry.

Art. 9. In controversies arising from a difference in regard to questions of fact, the powers should establish an international commission of inquiry to determine the facts by means of an impartial and thorough inquiry.

Art. 10. These commissions are to be constituted by the parties to the controversy, who shall specify the facts to be examined and regulate the procedure of the commission.

Art. 11. These commissions are to be formed in the manner pointed out in Article 31.

Art. 12. The powers in controversy agree to do all in their power to aid the commission of inquiry to determine the facts.

Art. 13. The commission of inquiry shall present a report signed by all the members of the commission.

Art. 14. The report of the commission has to do only with questions of fact, and has not the character of an arbitral judgment; the powers are free to act upon the report as they see fit.

Title Fourth.— Of International Arbitration.

Chapter I. Of Arbitral Judgment.

Art. 15. International arbitration has for its object the determination of controversies between states by judges of their own choice, upon the basis of respect for law.

Art. 16. In questions of a judicial character, especially as to treaties, arbitration is acknowledged an efficacious and just method of deciding controversies which have not been determined by diplomacy.

Art. 17. An agreement of arbitration may be made in reference to present or future disputes, and may relate to all kinds of controversies or to those of a particular character only.

Art. 18. Agreement to arbitration implies the obligation to accept in good faith the decision of the tribunal.

Art. 19. Either before or after the ratification of this act the powers reserve the right to make new agreements with a view to extending the obligation to submit disputes to arbitration.

Chapter II.— Of the Permanent Court of Arbitration.

Art. 20. The powers agree to appoint a permanent court of arbitration, always to be open and ready to proceed in accordance with the rules of procedure included in the present convention.

ART. 21. This court shall have jurisdiction over all cases of arbitration unless the parties have agreed upon special arbitration.

ART. 22. An international bureau shall be established at The Hague, which shall serve as a clerk's office for the court. This bureau shall be the medium of communication, and shall preserve the court's archives. The powers agree to communicate to the bureau a copy of every agreement of arbitration and every judgment of an arbitral tribunal.

ART. 23. Within three months after the ratification of this act, each power shall name not to exceed four persons who are willing to be arbitrators. The same person may be named by different powers. Members of the court shall be appointed for a term of six years, and may be reappointed.

ART. 24. When the powers wish to bring a question before the court, the choice of arbitrators selected to constitute the tribunal shall be made from the general list of members of the court.

Unless otherwise specified, the tribunal shall be formed by each party naming two arbitrators, who shall choose an umpire. The bureau shall then arrange for the meeting.

ART. 25. The tribunal shall ordinarily sit at The Hague.

ART. 26. The international bureau shall be at the disposal of the arbitral tribunal. The court may act in controversies between powers that are not parties to this convention, or between parties who have and parties who have not signed it, by special agreement.

ART. 27. The powers agree to remind states in controversy that the permanent court is open to them — this to be considered a friendly act.

ART. 28. The diplomatic representatives of the signatory powers at The Hague shall constitute a permanent administrative council with the Minister of Foreign Affairs of the Netherlands as president. This council organizes the international bureau, and shall direct and control the same; it shall notify the powers of the constitution of the court, determine the rules of practice, decide administrative questions relating to the court's official duties; it shall make an annual report to the powers as to what has been done by the bureau.

ART. 29. The expenses of the bureau shall be borne by the powers.

Chapter III.— Of the Arbitral Procedure.

ART. 30. The powers agree upon the following rules of procedure unless the parties agree upon different rules.

ART. 31. Powers which resort to arbitration shall sign a special submission stating the subject of the litigation and extent of the powers of the arbitrators. This implies acceptance of the final decision.

ART. 32. The powers of the court may be conferred upon one or more arbitrators as designated by the parties to the controversy; or they may be selected from among the members of the permanent court established by this act. In case the parties do not agree upon the constitution of the tribunal it shall be formed as specified in ART. 24.

ART. 33. When a sovereign or the head of a state is chosen as arbitrator, the method of procedure shall be determined by him.

ART. 34. The umpire shall preside over the tribunal.

ART. 35. In case of death, resignation, or absence for any cause of one of the arbitrators the vacancy shall be filled as per the original method of appointment.

ART. 36. Unless otherwise specified by the parties to the controversy, the tribunal shall sit at The Hague.

ART. 37. The parties have the privilege of naming agents, attorneys, or counsel, to represent them.

ART. 38. The tribunal shall decide upon the languages which may be used at its sessions.

ART. 39. The arbitral tribunal may in general be divided into two distinct parts: the examination of evidence and the hearing; the latter to consist merely in the oral discussion of the matters presented by the parties before the tribunal.

ART. 40. Every document produced by one party shall be communicated to the other.

ART. 41. The oral hearings shall be under the direction of the president. They shall be published as the tribunal directs, and with the consent of the parties. After the taking of evidence has been closed, the tribunal may exclude from the hearing the presentation of other evidence by either party without the consent of the other.

ART. 42. The examination of evidence being closed, the tribunal has the right to exclude all new acts or documents submitted by one party without the consent of the other.

ART. 43. The tribunal, however, shall have the right to consider additional evidence submitted by either party, but said evidence must be made known to the other party.

ART. 44. The tribunal, moreover, may require the parties to produce all official documents, and in case of refusal may enter notice thereof upon its records.

ART. 45. Counselors for the parties are authorized to present all the pleas that they deem useful.

ART. 46. Counsel has the right to take exceptions and raise objections, the tribunal to rule finally on same.

ART. 47. Members of the tribunal may put questions to the attorneys of the parties and demand further explanations on doubtful points.

ART. 48. The tribunal is authorized to determine its own jurisdiction, by interpreting the submission, as well as any other treaties invoked in the matter, and also by applying the principles of international law.

ART. 49. The tribunal has the right to make rules of procedure for the direction of litigation.

ART. 50. When the counselors have presented their explanations and briefs, the tribunal shall declare the hearing closed.

ART. 51. Deliberations of the tribunal shall

be had in secret session. A decision shall be had by a majority vote. If any member refuse to vote, the fact shall be stated.

ART. 52. When the decision shall have been made by a majority vote, it shall be accompanied by an opinion in writing and signed by each member of the tribunal.

ART. 53. The decision shall be read at a public session of the tribunal.

ART. 54. The decision shall decide the controversy finally and without appeal.

ART. 55. The parties may, however, reserve in their submission the right to ask for a revision of this arbitral judgment. The same can be asked, however, only upon the discovery of additional evidence of a character to influence the judgment.

ART. 56. The decision is binding only upon the parties to the controversy. When it consists in the interpretation of a convention in which powers other than those in the immediate controversy are interested, the parties shall notify the other interested powers. Each of these other powers may take part in the proceedings, in which case the decision shall be binding upon them also.

ART. 57. Each party to the controversy shall bear its own expense, and an equal part of the expense of the tribunal.

Special Proviso. [Accompanying the signatures of the American delegates].—Nothing contained in this convention shall be so construed as to require the United States of America to depart from its traditional policy of not intruding upon, interfering with, or entangling itself in the political questions or internal administration of any foreign state; nor shall anything contained in the said convention be so construed as to require the relinquishment by the United States of America of its traditional attitude toward purely American questions. [This refers to the Monroe Doctrine.]

Peach, a fruit closely allied to the plum and cherry. The peach is one of the most delicious fruits of temperate climates. It thrives best in a loose, sandy soil and in localities having a large number of warm, sunshiny days. It is cultivated more extensively in the United States than in any other country. Its range is from the Gulf of Mexico to southern New England and the shores of Lake Ontario and Lake Michigan.

The tree is small, rarely exceeding twenty-five feet in height, and has small, willow-shaped leaves. The blossoms appear in early spring before the leaves and are a light pink or a pale blue. The fruit has a fuzzy skin and contains a rough, hard pit or stone. When ripe the fruit becomes a soft fleshy drupe. There are many varieties of peach under cultivation. See colored plate, **Fruit—Apple.**

Peale, REMBRANDT (1778–1860), artist, b. in Bucks co., Pa. When 17 years old executed a portrait of Washington, from whom he had three sittings. He painted portraits of many distinguished men. He was president of the American Academy, and also one of the original members of the Academy of Design. His portrait of Washington (1823) was purchased by Congress.

Peanut. See *Groundnut.*

Peanut Oil, the oil of the groundnut or peanut. In its manufacture the meats of the nuts are ground to a fine flour which is heated and packed into woven bags of horsehair called scrutins. The bags are placed in a hydraulic press which presses out the oil. After the first pressure the meal is removed and heated to a temperature of about 160 degrees and pressed again. The oil obtained at the second pressing is of an inferior quality and is worth only about half as much as that obtained at the first pressing. Peanut oil is used for making salads and in the manufacture of fine white soaps. The refuse left in the scrutins is a valuable food for cattle and sheep.

Pear, a tree growing wild in many parts of Europe and Asia, and from which the numerous cultivated varieties have originated. The fruit is characterized by a saccharine aromatic juice, a soft and pearly liquid pulp, melting in the mouth, as in the butter pear; or by a firm and crisp consistence, as in the winter bergamots. The pear is chiefly propagated by grafting or budding on the wild pear stock, or on stocks raised from the seeds of cultivated pears, called free stocks. It is also grafted on the quince, the medlar, and the white thorn. At the present day more than 200 varieties are enumerated, and constant accessions are made every year. France and the north of Italy are celebrated for the perfection to which they have carried the culture of this fruit. Numerous varieties are cultivated solely for the purpose of making perry, a liquor analogous to cider, and prepared nearly in the same manner. The wood is fine-grained, of a yellowish color, and susceptible of a brilliant polish. In the early ages of Greece it was employed in statuary.

Pearl, the name applied to a concretion produced within the shells of certain species of bivalve mollusks as the result of some abnormal secretory process. These concretions are highly valued, and are classed among the gems. The production of a pearl is generally begun by the introduction of some foreign body, such as a grain of sand, within the mantle-lobes. The presence of this body has the effect of setting up an irritant action, resulting in the deposition by the mantle of a quantity of nacreous material over the offending particle. This material, in certain species of mollusks, is of such a texture and character, and is so deposited in regular laminæ or layers, that in due time the structure known as a "pearl," varying in worth and brilliancy, is formed. Chief among such mollusks are the pearl-oyster, the pearl-mussel, and the fresh-water mussels.

The chief pearl-oyster fisheries are those of Ceylon, which, together with the fisheries in the Persian Gulf, were known to the ancients. The chief seat of the Ceylon fishery is in the Gulf of Manaar, on the northeast of the island. It begins in February or March, and extends over a period of about a month, a large fleet of boats being usually engaged in it. The ver

age depth at which the oysters are found varies from 60 to 70 ft., and the divers are let down by a stout rope weighted by a heavy stone. Having gathered a number of the oysters into a net, at the end of half a minute or so the diver is pulled up. The oysters being carried to shore, and laid in piles, in about ten days become thoroughly decomposed. They are then thrown into sea water, and carefully examined for pearls; while the shells, after being cleaned, are split into layers for the sake of the mother-of-pearl. The pearl-fisheries of Ceylon are a government monopoly, but the revenue derived from them is not a regular one, the fishery sometimes failing for years in succession. There was no fishery, for example, between 1837 and 1854, or between 1863 and 1874. The best pearls are found about Ceylon, Persia, and other eastern coasts. The pearl oyster occurs throughout the Pacific. Very fine pearls are obtained from the Sulu Archipelago on the northeast of Borneo. Of late years pearl-fishing has been started with considerable success in Australian seas; and it is carried on also in the Gulf of Mexico, upon the coast of California, and in the vicinity of Panama.

Pearls have formed valued articles of decoration and ornament from the earliest times. Julius Cæsar presented Servilia, the mother of Marcus Brutus, with a pearl valued in modern computation at $240,000, while Cleopatra was said to have swallowed one gem valued at $300,000 or $400,000. The "Pilgrim" pearl of Moscow is diaphanous in character, and weighs 24 carats.

Artificial pearls are largely made in France, Germany, and Italy. They are very well imitated by the scales of certain fishes. A substitute for black pearls is found in close-grained hæmatite, not too highly polished, and pink pearls are imitated by turning small spheres out of the rosy part of the conch shell.

Peary, Robert E., Arctic explorer, b. in Pennsylvania in 1854. He was graduated from Bowdoin College, and in 1885 became civil engineer in the U. S. navy. He has made four expeditions to the Polar regions, in 1888, 1891, 1893 and 1899. In this latest expedition (1899–1902) he reached the highest point yet attained in the Western Hemisphere (84° 17′ n.) See *North Polar Expeditions*.

Peasants' War, a great insurrectionary movement among the German peasantry, which in 1525 spread over the whole of Germany. The immediate cause of this movement was religious fanaticism, but the pent-up forces by which it was impelled grew out of the long course of oppression to which feudal customs had subjected the people.

Peat, a kind of turfy substance consisting of vegetable matter which has accumulated by constant growth and decay in hollows or moist situations on land not in a state of cultivation, always more or less saturated with water, and consisting of the remains, more or less decomposed, of mosses and other marsh plants. Peat is generally of a black or dark brown color, or when recently formed, of a yellowish-brown; it is soft and of a viscid consistence, but it becomes hard and darker by exposure to the air. When thoroughly dried it burns, giving out a gentle heat without much smoke; accordingly it is used as fuel in those countries where it abounds, as in Scotland and Ireland. It often covers large areas, forming what are called peat-bogs, and in these the accumulation of solid peat may reach a great depth, sometimes 50 ft. or more. When prepared for fuel in the ordinary way it is dug from the bog in rectangular brick-like masses, which are set up to dry on the spot, and when sufficiently dried are carried away and stacked. Peat, as it is cut from the bog, contains from 80 to 90 per cent. of water, and when air-dried it retains a proportion of water equal to from 15 to 25 per cent. of the whole weight. To increase its value as fuel several methods have been adopted; but in any successful process for treating peat it must be condensed by artificial means, and the water must be expelled and dried out economically.

Pecan′ (Pecan-nut), a species of hickory and its fruit, growing in North America. It is a large tree, with hard, very tough wood, pinnate leaves, and catkins of small flowers.

Pec′cary, a genus of quadrupeds nearly allied to the swine, in which family it is classified. These animals are exclusively confined

Peccary.

to America. In general form the peccaries resemble small pigs. The best known species are the collared peccary and the white-lipped peccary. The former occurs abundantly in South America, and also extends into North America, living generally in small flocks, which do not hesitate to attack with their tusks any one who meddles with them. Their food consists of maize, potatoes, sugar canes, and similar materials; and cultivated fields suffer much from their raids. This species of peccary is readily domesticated. The flesh is savory, and less fat than pigs' flesh. The peccary possesses a glandular sac or pouch, situated in the loins, which secretes a strongly smelling fluid of fœtid nature. This must be cut away immediately on killing a peccary, to avoid contaminating the flesh.

Pecos River, a river of New Mexico and Texas, which has a southeasterly course of about 800 mi., and falls into the Rio Grande del Norte, but in summer is generally dry.

Pecten, a genus of Mollusca, included in the

oyster family, and popularly designated under the name of "scallop shells." Numerous species of pecten—180 or more—are known. The common pecten and the frill or great scallop are the most common forms. The latter form is esteemed a delicacy, and as such is sold in the London markets. The shell of this species was borne in the Middle Ages by pilgrims in their hats, as a sign that they had visited the Holy Land. The shell is somewhat rounded, and terminates superiorly in a triangular "ear," in which the hinge exists. The name "pecten" is derived from the indentation of the edges and surfaces of the shell.

Pectose, an important ingredient of the vegetable kingdom constituting the base from which are derived all the jelly-like substances of fruits and vegetables. Pectose is the most abundant in unripe fruits and the roots of plants. Like cellulose, it performs different functions in different parts of the plant; as giving hardness to green fruits, aud other quality to roots. It is partially soluble, and extremely perishable. On this account, it seems impossible to procure pectose in a free state so as to purify it and determine its composition. It is supposed to be a carbohydrate; that is, a substance containing oxygen and hydrogen in the proportions in which they form water. In the process of ripening of fruit pectose turns a ferment called *pectase* into pectin or plant-jelley. Leading chemists realize the importance of pectose and are striving to discover some method to more fully understand its composition.

Pedagogics or Pedagogy, the science and art of teaching. The term is derived from *pedagogue*, which comes from a Greek word meaning a leader of children. The Greek pedagogue was a slave who acted as the attendant and protector of a child. Later the Romans applied the term to the slave who taught the child Greek. From this the significance of the term was transferred to one who teaches. *Pedagogics* has a narrower application than education; the term applies only to the principles and theories of education, whereas *education* is applied not only to the application of these principles and theories, but also to the establishing of whatever measures and systems may be necessary for this purpose. "Pedagogy, so to speak, is the theory of education, and education the practice of pedagogy."

The laws of psychology are the rules of teaching; consequently pedagogy is a derived science and is based on psychology. For this reason the study of psychology should precede the study of pedagogy. Since the principles of teaching apply to all phases of instruction, pedagogy is also related more or less directly to all sciences found in courses of study. It relates to biology and physiology in physical education; to logic, mathematics and the natural sciences in intellectual education; and to history, literature and ethics in moral education.

In the article *Education*, an account is given of the general trend of the various educational movements from ancient to modern times, and in the discussion of pedagogics, the successive methods employed are given attention.

While every educational system has been established for a definite purpose and the principles and theories adopted by its founders were such as they believed would lead up to their ideal, and while all systems contain some principles that are fundamental, yet those established previous to the Christian era have so little bearing upon modern theories and methods that their consideration is not necessary in a brief account.

I. The Humanists. *The Early Christian Fathers.*—The period of the Humanists extends from the founding of Christianity through the Middle Ages. Their theories and principles were the result of their purposes and ideals. Christianity set up new standards of life and revolutionized the thought of its followers. The purpose of education among the early Christians was to be able to interpret the Scriptures and to explain the subtlest truths of their religious belief. Education was consequently placed under the care of the church, and the early Christian fathers were the first of these educators. With few exceptions, reading and writing in Greek or Hebrew and religion were the only subjects taught. Most of the leaders in the church proscribed Latin and Greek authors, as their literature was that of the pagan world. The methods of instruction were dictatorial and arbitrary. Pupils were taught words before things, and unquestioned acceptance of the statements of their teachers. Independent thought or original investigation was not considered. While some of these early teachers admitted the Latin and Greek classics, the same methods of instruction were employed by all.

The Schoolmen.—The age of the Fathers was followed by that of the Schoolmen, and to this period most of the education of the Middle Ages belongs. During the greater part of the period, three systems of education were running parallel. These were monastic education, knightly education and secular education. Each of these systems was in marked contrast to the others. By the seventeenth century, monasteries were scattered through all the countries that had composed the Roman Empire. The prejudice against pagan writers had disappeared and the educational work of these schools was much broader than at the beginning of the era. The course of instruction embraced the seven liberal arts, which were divided into two classes, the trivium and the quadrivium. The first included Latin grammar, logic and rhetoric; the second, arithmetic, geometry, astronomy and music. Reading and writing were included under grammar. The completion of the course required seven years; all secular studies were pursued with reference to their interest to the church and the Latin language was taught to the universal neglect of the mother tongue. Later, logic absorbed the attention of the Schoolmen, who applied it to the development of theology. This produced a class of scholars who were

noted for their ability to develop abstract theories and their skill in reasoning on abstruse points of theology. Both their system of education and methods of instruction tended to withdraw these men from the world and to abnormally develop the memory and reason at the expense of the other powers. The educational system of the Schoolmen was unbalanced, but its methods became so firmly established that they have had a molding influence on the educational systems and theories of all succeeding centuries, and the great schools of some monastic orders, particularly the Benedictines, were at that time the leading educational institutions of the world.

Knightly education was the direct opposite of monastic. Its purpose was to fit the youth for the world. He was trained for war and the chase, to be truthful and to reverence women. He ignored the literature of Greece and Rome, but became reasonably conversant with his native language and dwelt upon the works of nature as the source of the noblest sentiments and purest joys. His inspiration was the love of glory and his ideal the knightly hero. Knightly education had a modifying influence on succeeding systems, though it contained but little that was of practical value.

The secular education of the town or burgher schools had its origin in the necessities arising from the industrial conditions of the age. It was the practical education of its time and gave special attention to reading and writing of the mother tongue, arithmetic, geography and history. In some schools, music and Latin were also added. These schools were under the supervision of the church and the methods of instruction were similar to those employed in the monastic schools; their course of study became, under the skillful direction of John Sturm, the foundation of that graded system of instruction that shaped the schools of Germany, England and America for three hundred years.

The Humanists based their system on the works and teachings of those who had preceded them in both the Christian and pagan world. While they infused the spirit of Christianity into much of their work and were inspired by lofty ideals of the relation between man and God, the supreme importance attached to the scriptures and religious tenets made their instruction dogmatic. They also exalted words over things, stifled the spirit of free inquiry, gave undue prominence to formal reasoning and made learning a process of memorizing. Humanistic education failed to secure the development of all the powers of man.

II. The Realists.—The methods and theories of the Realists are in marked contrast to those of the Humanists. This school of thinkers and educational reformers may be said to begin with the ascendency of Lord Francis Bacon (which see). Bacon is credited with being the originator of inductive philosophy (see *Induction* in *Logic*), in which inquiry, observation and experiment were substituted for the dictum of authority. Bacon's method is clearly illustrated in the following extract from Oscar Browning's *History of Educational Theories:* "The lock was to be opened, that was the problem. Other philosophers had tried key after key, each more complicated than the other. Bacon said, take the lock to pieces and examine its mechanism, and you will then be able to make a key which will open it." Bacon not only organized a new method of interrogating nature, but also reclassified the sciences, showing the degree of progress which each had made, and their relation to each other. He was the first to classify pedagogics, or the science of education, as a department of psychology.

While Bacon's system of reasoning was opposed by the Schoolmen, it was welcomed by a class of vigorous thinkers who arose during the early part of the seventeenth century. These men applied Bacon's doctrine to education and promulgated theories which in time caused a strong reaction against the abstract education of the Humanists.

Ratich.—The first of these reformers of note in the educational world was Wolfgang Ratke or Ratich. He was a theorist rather than a practical reformer and did not succeed in establishing his theories or in modifying the educational system of his country, yet his aphorisms contain a number of principles which lie at the foundation of the most widely accepted theories of the present day.

John Amos Comenius, a Moravian bishop, was a more vigorous and practical reformer than Ratich and may be considered the founder of modern methods of instruction. He was the first who successfully applied Bacon's method of inquiry to the instruction of children. The first reform instituted by Comenius was in the teaching of languages. This he accomplished through his book, *Janua Linguarum Reserata*, or *The Gate of Tongues Unlocked*, which appeared in 1631. This book possessed the following points of merit: (1) It was adapted to the pupil's capacity; (2) the lessons were carefully graded; (3) it taught things in connection with words. This work was translated into all the leading languages of Europe and also into Arabic and one of the languages of India. It revolutionized the methods for teaching language wherever it went. In 1658, an enlarged and revised edition appeared under the title of *Orbis Sensualium Pictus*, or the *Illustrated World of Sensible Objects*, in which all the objects named were accompanied by pictures. This was the first illustrated text book in the world and was for many years the most popular text book of Europe; its introduction was the beginning of systematic training of the powers of observation.

Comenius also gave careful study to the organization of school systems as well as to methods of instruction, and worked out a plan of graded instruction based upon his theories and more complete than that instituted by Sturm. It included four grades of instruction, beginning with the home life of a child where he was first trained by the mother, and extending to the university. According to this sys-

tem, the child was to receive an elementary initiation into all studies. Moreover, the mental powers were to be trained in the order of their natural development; viz., observation, memory, imagination and reason. The following principles gleaned from the writings of Comenius will be recognized as constituting the basis of the most generally accepted educational theories of modern times:

"1. Education is the development of the whole man.

"2. Educational methods should follow the order of nature.

"3. Both sexes should receive equal instruction.

"4. Learning should be made agreeable.

"5. There should be an easy gradation in studies.

"6. Things naturally connected in themselves should be joined together in teaching.

"7. Studies should be adapted to the capacity of the pupil.

"8. Nothing is to be learned by heart that is not first thoroughly understood.

"9. Words should be learned in connection with things.

"10. The concrete should precede the abstract; the simple, the complex; the nearer, the more remote.

"11. Things to be done should be learned by doing them."

These principles entitle Comenius to rank as one of the greatest educational reformers of the world. His system and methods aimed at the development of the whole man, but he was far in advance of his time. The thought of the seventeenth century was so strongly wedded to that of the sixteenth, that so radical a change as that which he proposed could only be accomplished in a long term of years.

The conflict between the Humanists and Realists, which began in the seventeenth century, was handed down to the eighteenth and has been transmitted to successive generations, but with a constant convergence of the fundamental ideas in the two systems; and the beginning of the twentieth century saw a wise selection of the best in each, blended in the most advanced educational systems of the world.

The New Education.—The eighteenth century was one of discontent; it was characterized by radical changes in political, religious and educational thought. During the century there was continual controversy between the Humanists and the Realists and, with scarcely an exception, the Humanists were in supreme control of public education, but their methods were to some extent modified by the works of Comenius. Various reformers arose who added much to educational progress. This was done more by their reiterating the principles of Comenius and placing them before the people in a new light and more attractive form, than by adding anything really new in the way of principles and theories. The three most celebrated reformers of this period were Locke, Rousseau and Pestalozzi, all living during the latter half of the century, and Pestalozzi doing his most effective work during the first quarter of the century that followed.

John Locke (which see) considered that the mind at birth was like a sheet of blank paper upon which ideas were to be impressed as they were acquired. He gave special attention to physical education and was the originator of the aphorism, "a sound mind in a sound body." He followed Comenius in his idea of teaching the mother tongue before other languages and laid special stress on moral and religious training.

Rousseau (which see) was the great educational theorist of his age, and his treatise, *Emile*, was the most influential work of the century. Appearing in 1762, just as the Jesuits were driven from France, and written in an attractive style, it gained public attention and was instrumental in molding public opinion. Rousseau bases his theory upon two fundamental principles: (1) Nature is to be studied and followed; (2) education is an unbroken unity, extending from early childhood to maturity. He follows the method of observation instituted by Comenius and advocates manual training. *Emile* occupies an important place in the study of pedagogics, more on account of its influence than of any new principles which it contained.

Pestalozzi (which see) is the reformer to whom the educational progress of the nineteenth century owes the greatest homage. In both Catholic and Protestant countries great efforts had been made toward the development of popular instruction, but the public schools were nevertheless in a wretched condition. Domestics, discharged soldiers, corrupt artisans, degraded students and other grossly unfit persons were employed as teachers. To Pestalozzi, more than to anyone else, is due the reform in these institutions which has given us the primary school as found in Germany and the United States to-day. With the acceptance of Pestalozzi's principles and theories, the New Education may be said to have fairly begun, though a long time has been required for its general extension to the public schools of Europe and America. As summarized by Dr. Payne in *Painter's History of Education*, the principles of Pestalozzi, briefly stated, are:

1. The principles of education are sought in human nature.

2. This nature is organic, consisting of physical, intellectual and moral capabilities, ready and struggling to develop themselves.

3. The function of the educator is both negative and positive. He must remove impediments to the learner's development, and he must also stimulate the exercise of his powers.

4. Self-development begins with sensations received through the senses. These sensations lead to perceptions which, registered in the mind as conceptions or ideas, constitute the basis of knowledge.

5. "Spontaneity and self-activity are the necessary conditions under which the mind educates itself, and joins power and independence."

6. Practical aptness depends more on exer-

cise than on knowledge. "Knowing and doing must, however, proceed together. The chief aim of education is the development of the learner's powers."

7. All education must be based on the learner's own observation; * * "this is the true basis of all knowledge."

8. What the learner has gained by his own observation has become an actual possession, which he can explain or describe in his own words.

9. The learner's growth necessitates advancement from the near and actual to the more remote; hence from the concrete to the abstract, from particulars to generals, from the known to the unknown.

All these principles are embraced in the New Education, and the pedagogical movements of the last half of the nineteenth century have been along the line of their application. Attempts to solve the problems of education have been very generally studied under the following phases:

1. *Child Study.*—The study of children from a physiological as well as a psychological point of view, has been prosecuted in Germany and the United States with a good degree of success. Much valuable information has been collected on the rapidity of growth in different years, the condition of the senses as to normal development, and the relation of defective senses to the mental development of the child. The maximum rate and precision of voluntary movement has been tested in thousands of children and the results taken into consideration in the teaching of drawing, writing and oral reading. Endurance and fatigue; aptitudes and interests; the contents of children's minds; the scope of the memory at different ages; the rapidity of improvement in different children of the same age, and many other conditions bearing directly or indirectly upon instruction in the elementary school have been determined and placed before the teachers for their guidance.

2. *The Subject-matter of Education.* — This subject has been the cause of contention between the Humanists, who have placed great stress upon the ancient classics, and the Realists, who consider such subjects as the natural sciences, modern languages and history as the most important. During the last half of the nineteenth century, the more practical subjects have rapidly gained ground in American and German colleges and universities, and the present tendency is to grant them precedence over Latin and Greek. This subject has also caused a great deal of discussion concerning the methods of elementary instruction; these are generally known as the concentric and the historical methods. According to the concentric method, the child is taught only a few central facts in the primary grade, and these are expanded and added to from year to year as his mental development increases. The historical method proceeds on the assumption that the child, during his mental development, passes through substantially the same stages as the race has passed through in reaching its present stage of civilization. These stages are known as culture epochs; and all subjects containing a human element, such as history and literature, should be arranged to conform to these various culture epochs. The leading advocates of the historical method are the German educators, Ziller and Herbart, and they have found a large following in Germany and America.

3. *Co-ordination and Correlation of Studies.*— These terms mean, respectively, deciding what studies shall be given equal rank in a course of study, and what studies are naturally related to each other. The solution of this problem is largely dependent upon the theory of instruction adopted, and its discussion in the United States is of quite recent origin. It is agreed that such an association of studies as leads each to reinforce the others, enhances the pupil's interest in his work, gives him a better understanding of the subjects, and strengthens his power of volition. Those who believe moral culture to be the greatest aim of education, consider such studies as history and literature of first importance; those who accept the idea of the philosophical unity of knowledge as a basis for co-ordination place the various branches of natural science, ethnology, anthropology and history as the central or knowledge subjects; while others consider that there are independent co-ordinate groups of studies and that the subjects of each group should be correlated according to their natural relations.

4. *Methods of Teaching.*—The dependence of methods of instruction in elementary schools upon the laws of psychology is now universally recognized, and more attention is given to the professional training of teachers than ever before. This result has been brought about very largely through child-study and the study of experimental psychology. The trained teacher understands that instruction is limited by the knowledge, aptitude and interest of the pupils, and that methods of instruction must meet these conditions. The multiplication of normal schools, the establishing of departments of pedagogy in many of the leading colleges and universities of the United States, and the unprecedented growth of pedagogical literature during the last quarter of the nineteenth century are evidence of the general interest in education, and of our progress in perfecting the public school systems of the country. See *Education;* also *Guideposts*, pp. 117, 118, subhead *Education.*

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Practice of Teaching, Page; *Method in the Recitation*, McMurry; *Philosophy of Teaching*, Tompkins, and *Waymarks for Teachers*, Arnold. On school management: *School Economy*, Wickersham; *The Art of School Management*, Baldwin; *School Management*, White.

Pedestal, a base or block on which statues, columns and monuments usually rest. In classic architecture the pedestal was much used. A complete pedestal like a column (which see) has a base and a cornice or sort of capital usually called the sur-base. The part called the dado or die is the shaft or plain block.

Pedee', GREAT AND LITTLE, two rivers. The former rises in North Carolina, enters South Carolina and falls into the Atlantic; total course 360 mi. of which 200 mi. are navigable for boats of 60 or 70 tons. Little Pedee rises in North Carolina, and enters the Great Pedee 32 mi. above its embouchure.

Pedicella'riæ, certain minute organisms or structures found attached to the skin or outer surface of star fishes, sea urchins, and other Echinodermata. Each pedicellaria consists essentially of a stalk attached to the organism, and bearing at its free extremity two or more movable blades or jaws, which close and open on foreign particles so as to retain them. The exact nature of these structures is still a matter of doubt.

Pediment, in classic architecture, the triangular mass resembling a gable, above the entablature at the end of buildings or over porticoes. The pediment is surrounded by a cornice, and is often ornamented with sculpture. The triangular finishings over doors and windows are also called pediments. In the debased Roman style the same name is given to these same parts, though not triangular in their form. In the architecture of the Middle Ages small gables and triangular decorations over openings, niches, etc., are called pediments.

Peddlers are itinerant dealers who carry their goods from place to place for sale. In the U. S. they are denominated hucksters and are regulated by license in most cities. In England they are called hawkers

Pedom'eter is an instrument like a watch, which serves to indicate the distance a pedestrian traveler has gone, or rather the number of paces he has made. See *Cyclometer*.

Pedro II (1825–1891), ex-emperor of Brazil, was b. at Rio Janeiro, succeeded to the throne on the abdication of his father, Dom Pedro I, in 1831. Brazil prospered greatly under the rule of Pedro II, who did much to develop its resources in every direction. In 1871 he issued an imperial decree for the gradual abolition of slavery, which totally ceased in Brazil in May, 1888. He made several visits to Europe, and was deposed by the revolution of November, 1889.

Peekskill, Westchester co., N. Y., on Hudson River, 42 mi. n. of New York. Railroad, N. Y. C. & H. R. Industries: underwear factory, flouring mill, five iron foundries, hat and shirt factories, machine shops, and electrical works. Surrounding country agricultural. The village was first settled in 1764. Pop. 1900, 10,358.

Peel, SIR ROBERT (1788–1850), British statesman, was b. near Bury in Lancashire. He was sent to Harrow and Oxford, where he took his bachelor's degree in 1808, with double first-class honors. Immediately on attaining his majority he was elected member of Parliament for Cashel; in 1810 he became under-secretary of state for the colonies, and in 1812–18 he was chief secretary for Ireland. In 1817 he was elected representative of the University of Oxford. In 1822, under the Liverpool ministry, he became home secretary. Refusing to take office under Canning, he joined the ministry of the Duke of Wellington in 1828 as home secretary. In 1830 he succeeded his father as baronet. In the election of 1832 he was returned for Tamworth, for which he continued to sit during the remainder of his life. On the dismissal of the Whig government in 1834 Peel undertook the government, but his party in the house being in a minority the task was hopeless. The general election of 1841 gave him a large majority, and the formation of a Conservative ministry could no longer be delayed. In 1844 and 1845 he passed his celebrated English and Scotch Banking acts. During the recess in 1845 the potato rot and famine in Ireland brought the question of the corn laws to a crisis, and Peel declared in favor of their total repeal. By his will he renounced a peerage for his family, as he had before declined the garter for himself.

Peer, in general, signifies an equal, one of the same rank and station. In this sense it is used by the common law of England, which declares that every person is to be tried by his peers. Peer also signifies in Britain a member of one of the five degrees of nobility that constitute the *peerage* (duke, marquis, earl, viscount, baron), or more strictly a member of the House of Lords.

Peffer, WILLIAM A., U. S. senator, was b. in Cumberland co., Pa., Sept. 10, 1831. An exponent of the ideas advocated by the Farmers' Alliance. He was elected U. S. senator from Kansas for term beginning March 4, 1891.

Pegu (pe'gö), now a division of Lower Burmah, but previous to 1757 a powerful and independent kingdom, and from that period up to 1853 a province of the Burmese Empire, from which it was severed and annexed to the British dominions in 1853. The province comprised the whole delta of the Irrawaddy; area 25,964 sq. mi.; pop. 2,323,512. The modern division of Pegu lies mainly on the east of the lower Irrawaddy. Area 9,159 sq. mi.; cultivated area 2,043 sq. mi.; pop. 1,162,393. Chief town, Rangoon.

Pei-ho (pe-i-hō'), a river of Northern China, rises near the Great Wall, and flows southeast to the Gulf of Pechelee. It is navigable for boats to within 20 mi. of Peking, which it passes at the distance of about 10 mi. At its mouth is the small town of Taku, with several forts, which acquired some note in the war with the British and French in 1860.

Peipus (pe'i-pus), a lake of Russia, be-

tween the governments of St. Petersburg, Revel, and Livonia; length 55 mi.; breadth 30 mi. It discharges itself by the Narova into the Gulf of Finland. It is well supplied with fish.

Peixoto, Floriano (1842–1895), a Brazilian statesman, b. at Alagoas. He served in the Brazilian army in the war with Paraguay from 1865 to 1870. He was made minister of war after the republic was formed in 1890, and elected vice president the following year. He succeeded to the presidency in November, 1891.

Pekin, Tazewell co., Ill., on Illinois River, 10 mi. from Peoria. Railroads: P. D. & E.; C. P. & St. L.; Santa Fé. Industries: two iron foundries, flouring mill, extensive distilleries and others. Pop. 1900, 8,420.

Peking′, (or Pekin′) the capital of the Chinese Empire, in the province of Chih-le or Peche-lee, on an extensive, barren, sandy plain, between the rivers Pei-ho and Hoen-ho, about 40 mi. from the Great Wall, and 100 mi. from the Gulf of Pechelee. The entire circuit of the walls and suburbs of Peking is reckoned at 30 mi. There are in all sixteen gates leading into the city, each protected by a semicircular enceinte, and a higher tower built in galleries. The city consists of two portions, the north or Tartar city, and the south or Chinese city. The former is built in the shape of a parallelogram, and consists of three enclosures, one within the other, each surrounded by its own wall. The innermost enclosure contains the imperial palace, and buildings connected with it, in which the emperor and royal family reside. The second enclosure is the residence of the imperial princes and officials of the highest rank. The outer or Tartar city proper is the seat of the six supreme tribunals, and contains the legations of Great Britain, France, the U. S., and Russia. In the Chinese city broad, straight streets run from gate to gate, intersecting each other at right angles, but they are unpaved, and in rainy weather impassable from mud. Among the principal public buildings of Peking are the Temple of Eternal Peace, belonging to the lamas; the Mohammedan mosque; the observatory; the Temple of Agriculture; and the Temple of Heaven. In the latter temple the emperor periodically offers sacrifice. It is a vast circular building surmounted by a couple of inverted saucer-shaped roofs, one over the other, and the exterior is brilliantly and harmoniously colored. It occupies a commanding position, and is approached from the different sides by magnificent alabaster stairs. There are religious edifices appropriated to many forms of religion, the principle of toleration being here carried to the utmost extremity — among these are the Greek and Latin churches, Moslem mosques, Buddhist temples, besides temples dedicated to Confucius and other deified mortals. Among the institutions of Peking are the national college, the medical college, astronomical board, and the imperial observatory. Peking is sustained solely by its being the seat of government, having no trade except that which is produced by the wants of its population. Peking is regarded by the Chinese as one of their most ancient cities, but it was not made the capital of the country until its conquest by the Mongols about 1282. In the war of 1860 Peking was occupied by the British and French on October 12, and evacuated by them, after the signing of a convention, on November 5. Pop. variously estimated at from 500,000 to 1,650,000. (For Boxer trouble see *China.*)

Pela′gius, the name of two Popes: Pelagius I, Pope from 555 to 560, took an active part in the controversy of the *Three Chapters of Justinian.* Pelagius II, Pope from 578 to 590, was elected when Rome was besieged by the Lombards. During his entire pontificate he tried in vain to bring an end to these troubles. Just before his death came the welcome news that the West-Goths in Spain had returned from Arianism to the orthodox faith.

Pelagius, the author of a heresy known as Pelagianism. He was a monastic of great erudition and eloquence, and wrote fourteen books on St. Paul's Epistles, in which he denied the transmission of original sin. St. Augustine in his *De Gestis Pelagii* attacked Pelagius, whose errors were condemned by the Council of Carthage in 416.

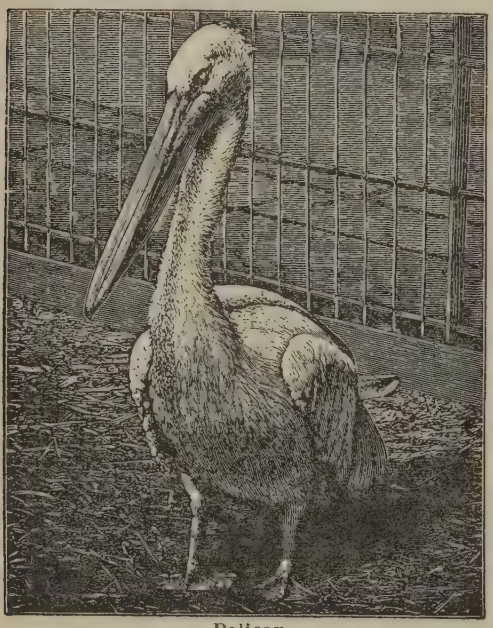
Pel′amis, a genus of venomous sea snakes, often found swimming in the ocean at great distances from land. It has a length of 2½ ft., and is black above and yellow beneath.

Pelas′gians, a prehistoric race widely spread over the whole of Greece, the coasts and islands of the Ægean, and also in Asia Minor and Italy. Neibuhr regarded them as a great and widely spread people, inhabiting all the countries from the Po to the Bosporus, and supplying a common foundation to the Greek and Latin peoples and languages. A common view is that they were simply the earliest Hellenic inhabitants of Greece.

Pelew′ Islands, a group belonging to the Caroline Archipelago, in the North Pacific Ocean. They are about twenty in number, extend nearly n.n.e. and s.s.w. 87 mi., and are completely encircled by reefs. They are fertile, and enjoy a good climate. The inhabitants are Polynesians, and have generally got a high character from visitors. Pop. 6,000.

Pel′ican, the name of several web-footed birds. They are larger than the swan, have a great extent of wing, and are excellent swimmers. Pelicans are gregarious and frequent the neighborhood of rivers, lakes, and the sea coast, feeding chiefly on fish, which they capture with great adroitness. They have a large flattened bill, the upper mandible terminated by a strong hook, which curves over the tip of the lower one; beneath the lower mandible, which is composed of two flexible, bony branches meeting at the tip, a great pouch of naked skin is appended, capable of holding a considerable number of fish, and thus enabling the bird to dispose of the superfluous quantity which may be taken during fishing expeditions, either for its own consumption or for the nourishment of its young. The species

are found in Europe, Asia, Africa, and America. They sometimes perch upon trees; the nest is of rough construction, usually placed close to the water. The common or white pelican is colored a delicate white, tinged with rose or pink. The young birds are fed by the parents with fishes from the pouch, and the males are said to feed the incubating females in a similar manner. The common pelican inhabits Europe, Asia, and Africa. About the middle of September flocks repair to Egypt. During the summer months they take up their abode on the borders of the Black Sea and the shores of



Pelican.

Greece. The pelican is not only susceptible of domestication, but may even be trained to fish for its master.

Pelican Fish (*Eurypharynx pelecanoides*), a remarkable deep-sea Teleostean fish, described by Vaillant in 1882. The body is somewhat eel-like, and is fringed on the dorsal and ventral middle line with spinous rays. It is the region of the jaws, however, which is most remarkable, the gape is so enormous. The fish probably engulfs small animals in whale-like fashion, but at the bottom of the sea instead of at the surface. Gill and Ryder discovered a similar form, *Gastrostomus bairdii*, in 1883, in which the mouth again suggests a pelican's pouch. The equally strange Saccopharyngidæ are perhaps allied, but the jaws are less enormous, and the animals are notable for swallowing fishes larger than themselves.

Pella, the ancient capital of Macedonia, and the birthplace of Alexander the Great. It surrendered to Paulus Æmilius 168 B.C., and from a large and magnificent city it sunk, under the Romans, to a mere station.

Pel'lico, Silvio (1788–1854), Italian poet, b. at Saluzzo, in Piedmont. By his tragedies of *Laodamia* and *Francesca da Rimini* he earned an honorable place among Italian poets. In the same year, with Manzoni and others, he established the periodical *Il Conciliatore.* The Marchioness of Barolo offered him an asylum at Turin, and he became her secretary.

Pelop'idas, in ancient Greek history, a Theban general and statesman. The supremacy of the Spartan faction in Thebes forced Pelopidas, with other exiles, to take refuge in Athens, but he returned in B.C. 379, and succeeded in overthrowing the Spartan party and recovering the citadel of Thebes. In the war which followed with Sparta Pelopidas distinguished himself in the battle of Tegyra and of Leuctra by which Thebes became for a time the leading power of Greece. In 364 he was sent against Alexander of Pheræ, tyrant of Thessaly, whom he defeated, though he himself was slain.

Peloponne'sus, the peninsula which comprehends the most southern part of Greece, now called the Morea. Peloponnesus was anciently divided into six states: Messenia, Laconia (Sparta), Elis, Arcadia, Achaia, and Argolis, to which some add Sicyon.

Pe'lops, in Greek mythology, son of Tantalus, king of Lydia. He married Hippodamia, a daughter of King Œnomaus of Elis, and succeeded his father-in-law in that kingdom. Peloponnesus received its name from him. Of his sons, Atreus and Thyestes are most celebrated. Many and different myths are connected with his name.

Pelvis (Latin, *pelvis*, a basin), the bony basin formed by the "haunch bones" and sacrum of vertebrata, which constitutes the girdle or arch giving support to the lower or hinder limbs. The pelvis thus corresponds to the shoulder girdle of the upper or fore limbs; and forms a cavity or basin in which several of the abdominal viscera, and organs relating to reproduction and the urinary functions, are protected and contained. The pelvis consists of four bones, the front and sides being formed by the two *ossa innominata* or innominate bones, and the circle being completed behind by the *sacrum* and the *coccyx.* Each innominate bone consists in early life of three pieces termed *ilium*, *ischium*, and *pubis*, and they meet in front at the *symphysis pubis.* The pelvis of man differs materially from that of woman, the differences having chiefly reference to the greater capacity required for the womb during pregnancy, and for the expulsion of the child at birth. It also varies somewhat in different races of men.

Pen, an instrument for writing with a fluid. Pens of some sort have been in use from very early times, adapted to the material on which the characters were to be inscribed. The metallic stilus for the production of incised letters was probably the earliest writing implement. It was used by the Romans for writing on tablets coated with wax; but both they and the Greeks also used what is the true ancient representative of the modern pen, namely, a hollow reed, as is yet common in Eastern countries. It has been asserted that quills were used for writing as early as the fifth cen-

tury A.D. In Europe they were long the only writing implement, the sorts generally used being those of the goose and swan. Up till the end of the first quarter of the present century these formed the principal materials from which pens were made. In 1803 Mr. Wise produced steel pens of a barrel form, mounted in a bone case for carrying in the pocket. They were of indifferent make, and being expensive were very little used. Joseph Gillott commenced the manufacture about 1820, and succeeded in making the pen of thinner and more elastic steel, giving it a higher temper and finish. He was followed into the same field by Mr. Perry and others, and their improvements have so reduced the cost and raised the quality, that a gross of better pens are now sold by the same makers at one sixth of the price of a single pen in 1821. Cast steel of the finest quality is used in the manufacture, and the various operations are performed by cutting, stamping, and embossing apparatus worked mostly by hand-fly presses. Birmingham was the first home and is still the principal center of the steel pen industry. Gold pens tipped with minute particles of iridium are now in somewhat extensive use, and a good one will last for years. Fountain pens and penholders, to carry a considerable supply of ink and to discharge it in an equal manner, were invented by Joseph Bramah.

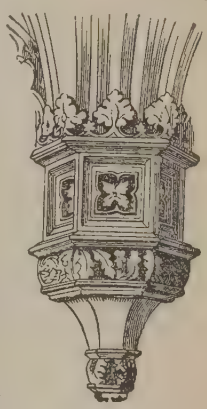
Penal Servitude, a punishment for criminal offenses, ranging from five years up to the life of the convict.

Penang' (Pulo-Penang, or Prince of Wales's Island), an island belonging to Great Britain, lying at the north entrance of the Straits of Malacca off the west coast of the Malay Peninsula. Two fifths of Penang is plain, and the rest hills. The climate is healthy. The island produces cocoanuts and arecanuts, nutmegs and cloves, rice, sugar, coffee, and pepper. George Town, or Penang (pop. 44,267), the capital and port of the settlement, is a handsome town, rapidly increasing in size, and has a large commerce. Pop. of Penang, 90,951.

Pena'tes, the private or public gods of the Romans. The images of these gods were kept in the penetralia, or central part of every house, each family having its own Penates and the state its public Penates,

Pencil, an instrument used for painting, drawing, and writing. The first pencils used by artists were probably pieces of colored earth or chalk cut into a form convenient for holding in the hand. On the introduction of moist colors, however, delicate brushes of fine hairs were used. Pencils of this kind, and of various degrees of fineness, are now almost solely used by painters for laying on their colors; but in China and Japan they are generally employed, instead of pens, for writing. The hairs used for these pencils are obtained from the camel, badger, squirrel, sable, goat, etc. The hairs, being selected, are bound in a little roll by a string tied tightly round their root ends. The roll is then fixed into the end of a quill tube. For larger pencils a socket of tin plate is used instead of the quill. Black-lead pencils, for writing or drawing, are made of slips of graphite or plumbago (otherwise known as black-lead), generally cased in cedar wood. The finest qualities of graphite used to be obtained only from the Borrowdale mines in Cumberland. Blocks of graphite, however, are now rarely found of such size and purity that they can be sawn up into the small square slices of ordinary pencil length; but a method has been devised of purifying the inferior varieties, which are ground to a fine powder, levigated or washed until pure, intimately mixed with clay in various proportions, and afterward solidified by pressure. The comparative hardness and blackness of pencils are attained by the degree of heat to which they are subjected and the proportions of graphite and clay in the leads. Nuremberg is the great center of the lead-pencil trade. Colored pencils are prepared from various chalks, such as are used for crayons, instead of the graphite. Pencils for writing on slate are made by cutting slate into small square pieces and rounding them, or into narrow slips and incasing them in wood.

Pendant, in architecture, is a hanging ornament used in the vaults and timber roofs of Gothic buildings, more particularly in late Gothic work. In vaulted roofs pendants are of stone, and generally richly carved; in timber roofs they are of wood variously decorated. Fine examples of stone pendants are to be seen in the chapel of Henry VII, at Westminster Abbey.



Pendant.

Pendulum, in the widest sense, a heavy body suspended so that it is free to turn or swing upon an axis which does not pass through its center of gravity. Its only position of steady equilibrium is that in which its center of gravity is in the same vertical plane with the axis. If the body is displaced from this position it will tend to return to it, and it will oscillate or swing from one side of that position to the other until its energy is destroyed by friction, and it at length comes to rest. A small, heavy body suspended from a fixed point by a string, and caused to vibrate without much friction, is called a "simple pendulum." When the swings of a simple pendulum are not too great—that is, when they are never more than about 3° on each side of the position of rest—the pendulum is isochronous. The ordinary pendulum is what is properly a "compound pendulum." A compound pendulum, as seen in clocks, is usually a rigid, heavy, pendulous body, varying in size according to the size of the clock, but the "seconds" pendulum may be considered the standard. The pendulum is connected with the clockwork by means of the escapement, and is what renders the going of the clock uniform.

In a clock it is necessary that the period of vibration of the pendulum should be constant. As all substances expand and contract with heat and cold, the distance from the center of suspension to the center of gravity of a pendulum is continually altering. Pendulums constructed so that increase or diminution of temperature do not affect this ratio are called compensation pendulums. These take particular names, according to their forms and materials, as the *gridiron pendulum*, the *mercurial pendulum*, etc. The former is composed of a number of rods so connected that the expansion or contraction of certain of them is counteracted by that of the others. The *mercurial pendulum* consists of one rod with a vessel containing mercury at the lower end, so adjusted in quantity that whatever alterations take place in the length of the pendulum, the center of oscillation remains the same, the mercury ascending when the rod descends, and *vice versa*.

Penel'opē, in Greek mythology, the wife of Odysseus (Ulysses) and mother of Telemachus, who was but an infant when his father sailed against Troy. During the protracted absence of Odysseus, Penelopē was surrounded by a host of suitors, whom she put off on the pretext that before she could make up her mind she must first finish a large robe which she was weaving for her father-in-law Laërtes. To gain time she undid by night the work she had done by day. Her strategem was at last communicated to the suitors by her servants, and her position became more difficult than before; but fortunately Odysseus returned in time to protect his spouse, and slay the obnoxious wooers who had been living in riot and wasting his property.

Penguin, a family of natatorial or swimming birds adapted for living almost entirely in the

King Penguin.

water. They possess only rudimentary wings, destitute of quill feathers, and covered with a scaly integument or skin. Although useless as organs of flight the wings are very effective aids in diving, and on land they may be used after the fashion of fore limbs. The legs are placed at the hinder extremity of the body, and the birds assume an erect attitude when on land. The toes are completely webbed. They inhabit chiefly the high southern latitudes, congregating sometimes in colonies of from 30,000 to 40,000, There are three different types of penguins, represented by the king penguin, the jackass penguin, and the rock hopper. The jackass penguin and the rock hopper are about 2 ft. 3 in. in height, and the king penguin somewhat larger; but a fossil penguin of the upper Eocene stood from 6 to 7 ft. high.

Peninsular War, The, was caused by the intrigues and ambition of Napoleon who proposed the partition of Portugal, and placed his brother Joseph upon the throne of Spain. For a time the whole peninsula was occupied by French troops, but the Spanish and Portuguese peoples rose in defense of their liberties, and waged a fierce guerrilla warfare against the invaders. Of the memorable struggle which ensued the main features were the retreat of Sir John Moore to Coruña, and his glorious death there; the accession of Sir Arthur Wellesley to the supreme command; his formation of the celebrated lines of Torres Vedras, where he held the French armies in check until he had accomplished the complete liberation of Portugal; and his subsequent victorious march through Spain, marked by the great battles of Salamanca (1812) and Vittoria (1813). In the spring of 1814 the tide of war rolled through the passes of the Pyrenees into the south of France, where this great struggle was concluded by the crowning victory of Toulouse.

Penitentiary, a prison in which convicted offenders are confined and subjected to a course of discipline and instruction with a view to their reformation. The two systems of penitentiaries in the U. S. are known as the Pa. and N. Y. systems.

Penn, William (1644–1718), the founder of the state of Pennsylvania, was b. in London. In his fifteenth year he was entered as a gentleman commoner of Christ Church, Oxford, where he imbibed Quaker views, and was expelled from the university. His father sent him on travels in France and Holland, and in 1666 committed to him the management of a considerable estate in Ireland. At Cork he was committed to prison for attending Quaker meetings, and although he was very soon liberated he had to leave Ireland. In 1668 Penn appeared as a preacher and an author, and on account of an essay, entitled *The Sandy Foundation Shaken*, he was imprisoned in the Tower, where he remained seven months. During this time he wrote his most celebrated work, *No Cross, No Crown*, and *Innocency with Her Open Face*. In 1670 the meetings of Dissenters were forbidden, under severe penalties. The Quakers, however, continued to meet as usual, and Penn was once more thrown into prison. As he would not take the oath at his trial he was sent to Newgate for six months. On his release he visited Holland and Germany. In 1677, in company with George Fox and Robert Barclay, the Quaker, he again set sail on a

religious visit to Holland and Germany. The persecutions of Dissenters continuing to rage, Penn turned his thoughts toward the New World. From his father he had inherited a claim upon the government of $80,000, and in settlement of this claim the government in 1681 granted him large territories in North America, the present state of Pennsylvania, with right to found a colony or society with such laws and institutions as expressed his views and principles. The following year Penn came over to America and laid the foundations of his colony on a democratical basis, and with a greater degree of religious liberty than had at that time been allowed in the world. A great number of settlers, not only Quakers, but members of all denominations, Englishmen, Germans, Swedes, gathered together; the city of Philadelphia was laid out upon the banks of the Delaware, and the colony soon came into a most flourishing condition. He remained in the province about two years, adjusting its concerns, and establishing a friendly intercourse with his colonial neighbors. At the Revolution of 1688 Penn's intimacy with the abdicated monarch created suspicions, in consequence of which he was accused of treason, and withdrew from public notice till 1693. In 1699 he again sailed for Pennsylvania, intending to make it the place of his future residence; but he returned to England again in 1701. He d. at Ruscombe, Berks.

Pennat'ula, a genus of Cœlenterate animals, class Actinozoa, order Alcyonaria. The sea-pens consist each of a compound organism, which may be described as consisting of a main stem or *cœnosarc*, with lateral pinnæ or branches. These branches are crowded on their upper margins with the little polyps or individual animals that make up the compound mass, and which are connected together through the fleshy medium or cœnosarc. The lower end of the stem is fleshy, destitute of polyps, and contains an internal coral rod. By this fleshy root the sea-pens attach themselves loosely to the mud of the sea bed.

Pennsylvania (pen'sil-va'ni-a), the *Keystone State*, a Middle Atlantic state, one of the original thirteen, is bounded on the n. by Lake Erie and New York state; on the e. by New York and New Jersey; on the s. by Delaware, Maryland and West Virginia; on the w. by West Virginia and Ohio. Its form is very regular; it is 302.34 m. in length from e. to w., and 175.6 m. broad; its gross area is 45,215 sq. m. The population in 1900 was 6,302,115, of which 160,451 were colored.

Surface.—According to its physical features, Pennsylvania may be divided into three parts, a northern and western upland, an open district in the s. e. near the Bay, and a middle belt of parallel valleys and low parallel mountain ranges extending from s.w. to n.e. The mountains are a part of the Appalachian system; the principal ranges are the Laurel Hills, the Alleghany Mts., the Sidling Hills, the Tuscarora Mts., the Blue Mountains and South Mountain. The breadth of the entire mountain system exceeds 200 m.; the maximum height is 2,500 ft. The principal rivers are, the Delaware on the e. boundary; the Lehigh and Schuylkill, its branches; the Susquehanna, which, with its n.e. and w. branches and the Juniata, drains about 22,000 sq. m.; and the Alleghany and Monongahela forming the Ohio at Pittsburg.

Climate.—The climate of the state is different in the three natural divisions. In the n.w. and w. heat and cold are excessive and changes are abrupt. In the n. and mountain regions the winters are severe and the summers delightfully cool. The climate of the eastern section is marked by irregular alternations of the seasons. But the climate is, in general, healthful. The mean temperature at Philadelphia is 54°. The average annual rainfall ranges from 36 in. in the western counties to 42 in. at Philadelphia. Heavy snows fall on the mountains in winter, and the rivers of the western half of the state are often flooded in the spring.

Mining.—The coal regions of Pennsylvania are the richest in the world. The anthracite mines are divided into seven districts—Pittston, Wilkesbarre, Hazelton, Shenandoah, Ashland, Pottsville and Scranton. The bituminous districts are Monongahela City, Irwin, Mercer, Towanda, Connellsville, Johnstown, Idlewood and Phillipsburg. Sandstone, iron ore, limestone and fire-clay interstratify with the coal. Gneiss abounds in the s.e. Near Philadelphia are marble quarries, at Phoenixville lead and copper mines, in Lancaster co. nickel; in several counties magnetic iron ore. A part of the Appalachian oil field is in Pennsylvania. Of the annual shipment, 33,000,000 barrels, Pennsylvania produces half. Salt springs are abundant in the state, many of whom being still undeveloped.

Agriculture.—Agriculture is one of the leading occupations. In the production of rye, Pennsylvania ranks first in the Union. Great crops of corn, oats, wheat, buckwheat, potatoes and hay are produced. The state ranks sixth in the production of tobacco. Chester co. is famous for its nurseries. The mountain regions and the western plateau are well suited for grazing. One of the best sheepraising districts in the country extends across this state and into Ohio. The dairy products of the state have an immense value.

Manufactures.—Next to mining, manufacturing is the chief industry of Pennsylvania. The state ranks second in the Union in the value of its manufactures, which are chiefly of iron and steel. In iron products, Pennsylvania yields as much as all the other states combined. The first blast furnace was opened by Wm. Penn in 1688. The manufacture of Bessemer steel was begun in 1867. The state now ranks first in the production of pig iron (6,371,688 gross tons) and in Bessemer steel (3,488,569 gross tons). The manufacture of textiles ranks second among the industries of the state, Philadelphia being the greatest textile center in the country. The industry third in rank is the manufacture of foundry and machine shop products. The state ranks first

in the Union in the refining of petroleum, and in the manufacture of steam locomotives, of coke and of glass products. For 104 years, Pennsylvania has stood at the head of glass-making states. More ingrain carpets are made in Philadelphia than in any other city. Other important industries are leather tanning, car-building, tin plate manufacture, flouring and grist mills, lumber mills, planing mills, printing and publishing, tobacco factories, manufacture of malt liquors, and of men's and women's clothing. An industry of growing importance, and one in which the state ranked first in 1900, is iron and steel ship-building. The fisheries of the state are of great importance.

Transportation.—Early in the history of Pennsylvania the citizens learned that transportation was essential in building up commerce and began the construction of highways. The location itself on the Atlantic coast in communication with the navigable waters of the Ohio-Mississippi Valley and, through Lake Erie, with the great Lake system, proved a great stimulus to manufacturing. Between 1826 and 1839, communication in the interior of the state was improved by the construction of a network of canals. After the building of railroads, many of these were abandoned. The state now ranks second in the United States in railroad mileage, operating 10,181 m. of road. Some of the principal roads are: The Pennsylvania, B. & O., N. Y. C. & Hudson River, the Erie, L. S. & M. S., P. C. C. and St. L. and Lehigh Valley.

Education. — The Pennsylvania Germans were the most learned settlers that came to America. As early as 1686, a printing press was established in Philadelphia; in 1690, a paper mill was built; in 1741, Franklin printed books and magazines in Philadelphia; in 1743, Dr. Sauer printed a German bible at Germantown; in 1784, the first daily newspaper was founded in Philadelphia. Schools formed a part of the original scheme of government prepared by Penn. About 1718, Christopher Dock opened a school in Montgomery co. In 1726, the famous Log College was founded on the Neshaminy by Scotch Presbyterians. From this grew Dickinson College at Carlisle, Pa., and Princeton University, N. J. There are now in Pennsylvania an excellent system of public schools, several good normal schools, numerous business and professional schools, and over 30 universities and colleges. The University of Pennsylvania is at Philadelphia, the Western University of Pennsylvania at Allegheny and Pittsburg. Bryn Mawr (for women) at Bryn Mawr, Dickinson College at Carlisle, Lafayette College at Easton, Lehigh University at South Bethlehem, and the Drexel Institute of Art, Science and Industry at Philadelphia,

History.—In 1609, Henry Hudson discovered Delaware Bay. The first permanent settlement in the state was made in 1643 by Swedes at the present site of Chester; in 1655, the Dutch took the colony; in 1664, the English obtained possession; in 1681, the territory was granted by Charles II to Wm. Penn. In 1682, Penn came to America and made his famous treaty with the Indians, which was never broken. Penn, though an Englishman, had preached in Holland and Germany, and many friends whom he had won there flocked to the new country to escape persecution. The colony flourished. In 1755–1763, troubles with Indians on the frontier occurred, and in 1778 was the awful massacre of Wyoming. The First Continental Congress met in Philadelphia in 1774. Pennsylvania was active in all the momentous events of the Revolution. Independence was proclaimed on her soil, 1776; the battle of Germantown took place, 1777; Washington went to Valley Forge in December of the same year. During the Civil War several invasions were made by the Confederates into Pennsylvania: Gen. Stuart's raid, 1862; Lee's invasion, which culminated in the battle of Gettysburg, July 1–3, 1863; and Early's raid and the burning of Chambersburg, 1864. The principal cities of Pennsylvania, with population in 1900, are: Harrisburg, the capital, 50,167; Philadelphia, the third largest city in the U. S., 1,293,697; Pittsburg, 321,616; Alleghany, 129,896; Scranton, 102,026; Reading, 78,961.

Pennsylvania, UNIVERSITY OF, an institution of higher learning in Philadelphia, Pa., established in 1740 as a charitable school. In 1751 it was raised to the grade of an academy, in 1755 was converted into the College and Academy of Philadelphia, and in 1791 an act was passed making the institution a university with its present title. The university comprises the following departments: the college, including the art school, the courses for teachers and the Towne Scientific School; the departments of Philosophy (Graduate School), Law, Medicine, Dentistry, Veterinary Medicine and Archaeology; the Wistar Institute of Anatomy and Biology; Physical Education, and the Flower Astronomical Observatory. There is a provision for a large number of scholarships and 29 fellowships, with incomes ranging from $200 to $800. The medical school has achieved an international reputation, while the dental school is also widely known. In 1904 the university had 290 instructors, 2,550 students and a library containing 225,525 volumes. The president is Charles Custis Harrison.

Penob'scot, the largest river of Maine, U. S. of America. It flows 300 mi. s. by w. to Penobscot Bay. It is navigable for ships to Bangor, 60 mi., where the tide rises 17 ft.

Pensacola, Escampia co., Fla., on Pensacola Bay, 50 mi. s. e. of Mobile. Railroads: Louisville & Nashville; Alabama, Pensacola & Perdido. It is a port of entry; exports include fish, lumber, hides, tallow, wool, cotton and naval stores. The Pensacola navy yards are located at Warrington, 7 mi. seaward. Pop. 1900, 17,747.

Pensions, annual allowances of money settled upon persons, usually for services previously rendered. The pension system of the U. S. presents two peculiar features, in the al-

most entire absence of a civil list, and the non-recognition of long service as a ground for pension. Generally speaking, pensions are granted only for the active service in time of war, and therefore the beneficiaries are the survivors (or their widows and children) of the armies of volunteers and conscripts who took part in the country's several wars. On June 30, 1903, the list of pensioners, besides those arising out of the Civil War, was as follows: Revolution, widows 2, daughters 3; War of 1812, survivor 1, widows 1,115; Indian wars, survivors 1,565, widows 3,169; Mexican, survivors 5,964, widows 7,910; Spanish, survivors 9,200, widows 3,662. But the bulk of the U.S. pensions are "invalid pensions," for total or partial disability from wounds or other disease contracted during the Civil War. The widows and minor children under sixteen years of age of those who have died from such wounds or disease; or, in the event of no such widows or minor children surviving, then the dependent mothers, fathers, or minor brothers and sisters of officers or men so dying. The pensions, which range from $24 to $2,000 per annum, are graded, and many specific wounds and disabilities are scheduled and priced. Thus, where the regular aid and attendance of others is required, from $50 to $72 a month is paid; where the beneficiary is incapacitated for manual labor, $30 a month; for the loss of a hand or foot, or total deafness, $30, but of both feet or hands, or both eyes, $72 a month; and for amputation at the shoulder or hip joint, $45. Widows of privates receive $12 a month; dependent relatives the same; children $2 each, but if the widow does not survive they receive their pension jointly. Widows or dependent relatives of officers receive from $15 to $30 a month. The pension of widows ceases when they marry. For the administration of the pension system an independent bureau was created in 1833; since 1849 it has been a bureau of the department of the interior. Under the commissioner, who is appointed by the president, there are nearly 2,000 persons employed in the settlement of claims for pensions; and besides there are nearly 3,000 surgeons throughout the country engaged to examine applicants. The following figures show plainly enough the enormous growth of the American pension system. In 1862 the disbursements slightly exceeded $790,000, in 1872 they exceeded $30,000,000, in 1882 $54,000,000; while in the year ending June 30, 1888, they were over $82,000,000, in the next year over $87,000,000, and in the year ending June 30, 1890, $109,357,534. Moreover, in June, 1890, a dependent pension law was passed. In 1890 the pensions swallowed up more than one fourth of the entire revenue of the republic. There were 996,545 pensioners on the rolls in June, 1903. The number of pensioners under the law of 1890, upon the rolls in June, 1903, was 605,962. The total number of applications filed since 1861 is 2,924,701, of which 1,782,213 have been granted. The total cost of the pension bureau since its organization has been $3,037,826,081. The cost of administration during the year 1902-1903, $3,993,216, and the total disbursements, $138,890,088. The cost per capita of the population in 1903 was about $1.75. On April 13, 1904, by an executive order all veterans 62 years old are to receive $6 per month; at 65, this is to be increased to $8 per month; at 68 to $10; at 70 to $12 per month. This adds an annual expenditure of about $60,000,000. It may be added that by act of 1882 children of keepers or crew of a life-saving or life-boat station who perish in or from injuries received through the life-saving service are given the full pay of the deceased for two years.

Pen'tecost, a Jewish festival, held on the fiftieth day after the Passover, in celebration of the ingathering and in thanksgiving for the harvest. It was also called the *Feast of Weeks*, because it was celebrated seven weeks after the Passover. It is also a festival of the Christian church, occurring fifty days after Easter, in commemoration of the descent of the Holy Ghost on the disciples, called in England *Whitsuntide.*

Penum'bra, the partial shadow between the full light and the total shadow caused by an opaque body intercepting the light from a luminous body, the penumbra being the result of rays emitted by part of the luminous body. An eye placed in the penumbra would see part of the luminous body, part being eclipsed by the opaque body; an eye placed in the "umbra," or place of total shadow, would receive no rays from the luminous body; an eye placed anywhere else than in the penumbra and umbra sees the luminous body without eclipse. The subject is of importance in the consideration of eclipses. In a partial eclipse of the sun, as long as any part of the same is visible the parties observing are in the *penumbra;* when the eclipse is total, in the *umbra.*

Penza, a government of Russia, bounded by Nijni-Novgorod, Tambov, Saratov, and Simbirsk; area 14,996 sq. mi.; pop. 1,356,600. Its surface, though generally flat, is intersected by some low hills separating the basins of the Don and Volga. About 60 per cent. of the soil is arable, the chief crops being rye, oats, buckwheat, hemp, potatoes, and beet root, and about 14 per cent. is under meadows or grazing land. The forests are extensive. The chief exports are corn, spirits, timber, metals, and oils. Penza, the capital, is on an eminence at the junction of the Penza and Sura, 440 mi. s.e. of Moscow. It was founded in 1666 as a defense against Tartar incursions, is mostly built of wood, has a cathedral, several other churches, a theater, etc. Pop. 41,650.

Pe'ony (*Pæonia*), a genus of plants belonging to the natural order Ranunculaceæ, and very generally cultivated in gardens for the sake of their large showy flowers. The species are mostly herbaceous, having perennial tuberous roots and large, deeply lobed leaves. The flowers are solitary, and of a variety of colors, crimson, purplish, pink, yellow, and white. The flowers, however, have no smell, or not an agreeable one, except in the case of a shrubby species, *P. Moutan*, a native of China, of which several varieties, with beautiful whitish flowers

stained with pink, are cultivated in gardens. The roots and seeds of all the species are emetic and cathartic in moderate doses. *P.*

Peony.

officinālis or *festiva*, the common peony of cottage gardens, was formerly in great repute as a medicine.

Peoria, co. seat Peoria co., Ill.; on the Illinois river, 160 m. s. w. of Chicago. Railroads: there are eleven main lines, among which are the Burlington Route, C. R. I. & P.; Illinois Central and Vandalia Line. The city is in a corn and coal region, is noted for its manufacture of spirits and is the eighth grain market in the U. S. It has an extensive commerce by rail and water with Chicago, St. Louis and other cities. It manufactures, agricultural implements, malt liquors and foundry and machine-shop products. Pop. 1900. 56,100.

Pepin, the name of two distinguished Frank rulers of the eighth century, under the last kings of the Merovingian dynasty. 1. Pepin of Heristal, major-domo at the court of Dagobert II, was, after the death of the king, appointed duke of the Franks, and under a feeble regency ruled the kingdom with almost despotic sway. Charles Martel was his natural son. 2. Pepin le Bref, son of Charles Martel, was, by agreement with the pope, proclaimed king of the Franks in 752, after the deposition of Childeric III.

Pepper, a genus of plants which furnishes the black pepper of commerce, is a native of the East Indies, where it is cultivated on an extensive scale. It is a climbing plant with broad, ovate, acuminate leaves, and little globular berries, which, when ripe, are of a bright red color. The pepper of Malacca, Java, and especially of Sumatra, is the most esteemed. Its culture has been introduced into various other tropical countries. White pepper is the best and soundest of the berries, gathered when fully ripe, and deprived of their external skin.

Pepsin, a popular organic compound, which in the proportion of 0.78 to 100 parts, according to Schmidt, enters into the composition of the gastric juice. The nature of pepsin is little known. It is certain that it is in the nature of a ferment, and that it differs from *ptyalin*, the ferment of saliva, by its being active in a definitely acid medium, while ptyalin acts more freely in one faintly alkaline. Besides, pepsin is intimately connected with the acidity of its medium. Pepsin converts proteids into peptones (which ptyalin does not), and herein resembles the *trypsin* of the pancreas, which, however, acts in an alkaline medium, and the special ferment of the intestinal juice.

Pepsin can be isolated by digesting portions of the mucous membrane of a stomach in cold water, after maceration in warm water (about 90°). The cold water takes up little else than pepsin, which on evaporation it throws down as a grayish-brown viscid fluid. The addition of alcohol precipitates the pepsin in a grayish-white flocculi. The stomach secretes pepsin and hydrochloric acid, and the very vigorous action of the stomach depends upon the union of the two, converting the food into chyme, a pultaceous, grumous, semifluid mass, with a strong disagreeable acid odor and taste. See *Chyme*, *Peptones*.

As employed in medicine for digestive purposes, it is usually obtained from the stomach of the pig or calf by drying the fresh mucous lining of the stomach at a temperature below 100° F. It then forms a light yellowish-brown powder. It is only active in a dilute acid solution, 2 gr. in an ounce of distilled water, to which 5 drops of hydrochloric acid have been added, for a mixture in which 100 gr. of hard-boiled white of egg will digest or dissolve in about four hours at a temperature of 98° F. That prepared from the stomach of the pig, and known in medicine as *pepsina porci*, is preferred.

Pep'tones are a class of proteid substances, produced during digestion by the action on

Black Pepper.

the pepsin ferment of the gastric juice upon the nitrogenous elements of the masticated food in the stomach. The production of peptones is the main function of the digestion of

the stomach. Artificially albumen peptone may be produced by diluting white of an egg, and adding to it gastric juice or pepsin obtained in the usual manner, when it will be found after the mixture has been kept a short time at about 100° F., that the albumen will no longer coagulate on boiling; and if the solution be neutralized with an alkali, a precipitate of acid albumen is thrown down. If the neutralization be several times repeated till all the acid albumen is extracted there remains a considerable quantity of albumen in solution in the form of a peptone.

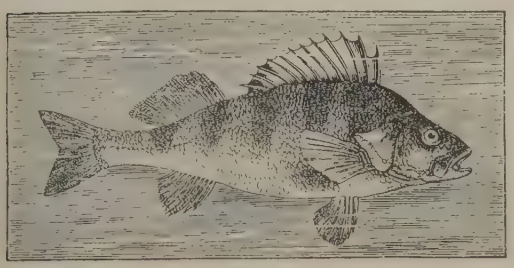
The main features of peptones, distinctive from other proteids, are 1, their ready diffusibility; 2, their stability as against precipitation by heat and many acids, etc., though they are thrown down easily by tannic acid and by perchloride of mercury; 3, their solubility in water and in neutral saline solutions.

It is evident that these present a remarkable series of differences in favor of digestibility. White of egg, for instance, being a colloid, is difficult of transmission through a membrane, and of course is quite insoluble when boiled, but it becomes akin to crystalloids as soon as it is acted on by the gastric juice, is easily soluble, and passes in solution through the membranous lining of the stomach into the system of surrounding blood vessels. The precipitated portion of the contents of the stomach (answering to the acid albumen in the above experiment) are usually called *parapeptones*. It is hardly necessary to observe that as there are many sorts of proteids so are there many varieties of peptones. At present the reason of peptonic change is little known, beyond that it is of a fermentative character.

Perception. See *Psychology*.

Per'ceval, Spencer (1762–1812), English statesman. On quitting Cambridge University he studied law. In 1801 he became solicitor general, and in 1802 attorney general. In 1807 he was appointed chancellor of the exchequer, and on the death of the Duke of Portland, in 1809, he became premier. In this post he continued till a person named Bellingham shot him dead with a pistol in the lobby of the House of Commons.

Perch, a genus of acanthopterous fishes, forming the type of the perch family. The



Perch.

common perch is a common tenant of fresh water lakes and rivers. The body is broad, and somewhat flattened laterally. There are two dorsal fins, the anterior supported by very strong spines. It is colored a greenish-brown on the upper parts, the belly being of a yellowish or golden white. The sides are marked with from five to seven blackish bands. The average weight is from 2 to 3 lbs. The perch is a voracious feeder, devouring smaller fishes, worms, etc. The American yellow perch is one of the most common and beautiful of the fresh-water fishes of the U. S.

Perennial, in botany, a term applied to those plants whose roots subsist for a number of years, whether they retain their leaves in winter or not. Those which retain their leaves are called *evergreens*, such as cast their leaves are called *deciduous*. Perennial herbaceous plants, like trees and shrubs, produce flowers and fruit year after year.

Perfectionists (or Bible Communists, popularly named Free-lovers), an American sect founded in 1838 by John Humphrey Noyes. Noyes was employed as a law clerk at Putney, in Vermont, when the fierce religious revival of 1831 spread over the New England states, but he abandoned law for religion, and took upon himself the restoration of the primitive Christian ideal.

Perfumes, substances emitting an agreeable odor, and used about the person, the dress, or the dwelling. Perfumes of various sorts have been held in high estimation from the most ancient times. The Egyptians, Hebrews, Phœnicians, Assyrians, and Persians are known to have made great use of them, as did also the Greeks and Romans. In the Middle Ages France and Italy were most conspicuous for the use and preparation of perfumes. Perfumes are partly of animal but chiefly of vegetable origin. They may be divided into two classes, crude and prepared. The former consist of such animal perfumes as musk, civet, ambergris, and such vegetable perfumes as are obtained in the form of essential oils. The prepared perfumes, many of them known by fancy names, consist of various mixtures or preparations of odorous substances made up according to recipe. At the present time the manufacture of perfumes is chiefly carried on in Paris and London, and in various towns near the Mediterranean, especially in the south of France. Certain districts are famous for certain productions; as Cannes for its perfumes of the rose, tuberose, cassia, jasmine; Nimes for thyme, rosemary, and lavender; Nice for the violet and mignonette. England claims the superiority for her lavender, which is cultivated upon a large scale at Mitcham in Surrey. The most expensive perfume in the market at present is the oil of rose petals, or otto of roses, $600 per lb. In making perfume the blossoms are taken from a bushy variety of the damask rose, and from the white musk rose. These roses are gathered in the latter part of May, and, as soon as picked, are taken to the distillery and placed in large, cool cellars. The stills are made of tinned copper with a miniature furnace underneath. About 25 lbs. of fragrant blossoms are put into each of them, water is added, and the fires started. When about one fifth of the contents has been

drawn over through a water-cooled worm, the still is emptied and recharged and the process is repeated until all the harvest of roses has been used up. The first product is simply rose water. This rose water is returned to the still and about one third of its bulk of second rose water is drawn over. Throughout this liquid there are scattered little globules of a precious oily attar very sweet to smell. The distillate is now put into bottles, and the oil gradually comes to the top and is dipped out with a spoon. This attar is worth about $6 an oz. Nearly all the ordinary perfumes are made by a process known as *enfleurage*. This consists in placing freshly gathered flowers in a glass case, the lid of which has been daubed with lard to the depth of half an inch. In the course of a day the lard absorbs all the essential oils in the flowers and they are replaced by fresh ones. When fully charged the lard is scraped off, melted and combined with alcohol, which brings the volatile oil to the surface. It is then skimmed off and filtered, and is ready to be bottled and shipped. The waste leaves from the process are used as fertilizers.

Pergunnahs (Parganás), THE TWENTY-FOUR, a district in India, forming the metropolitan district of the lieutenant governorship of Bengal; area 2,128 sq. mi. They form a great alluvial plain, part of the delta of the Ganges, intersected by innumerable river channels, creeks, and canals. Pop. (exclusive of Calcutta) 1,618,420.

Per'icles (-klēz) (494–429 B.C.), one of the most celebrated statesmen of ancient Greece, b. at Athens. He was connected by family relations with the aristocracy, but as Cimon was already at its head he endeavored to gain the favor of the popular party. In this he fully succeeded by his eloquence, abilities, and political tactics, so that on the death of Cimon, in 449 B. C., Pericles became virtual ruler of Athens. By his great public works he flattered the vanity of the Athenians, while he beautified the city and employed many laborers and artists. His chief aim was to make Athens undoubtedly the first power in Greece, as well as the chief center of art and literature, and this position she attained and held for a number of years. At the commencement of the Peloponnesian War (B. C. 431), in which Athens had to contend against Sparta and other states, Pericles was made commander in chief. The Spartans advanced into Attica, but Pericles had made the rural population take refuge in Athens and refused battle. After they retired he led an army into Megaris, and next year he commanded a powerful fleet sent against the Peloponnesus. In 430 B. C. a plague broke out at Athens, and for a brief period Pericles lost his popularity and was deprived of the command. The people, however, soon recalled him to the head of the state, but amid his numerous civil cares he was afflicted by domestic calamities. Many of his friends, and his two sons, Xanthippus and Paralus, were carried off by the plague; and to console him for this loss the Athenians allowed him to legitimize his son by Aspasia. Pericles was distinguished by intellectual breadth, elevated moral tone, unruffled serenity, and superiority to the prejudices of his age. His name is intimately connected with the highest glory of art, science, and power in Athens.

Périer (pā-ri-ā), CASIMIR (1777–1832), French statesman, was b. at Grenoble. In 1802 he established a prosperous banking house in company with his brother. In 1817 he was elected to represent the department of the Seine in the Chamber of Deputies. Here he became one of the leaders of the Opposition under Charles X, and was no less distinguished as the firm and eloquent advocate of constitutional principles than as an enlightened and sagacious financier. After the revolution of 1830 he was prime minister to Louis Philippe.

Perim, an island in the Strait of Bab-el-Mandeb, at the entrance to the Red Sea, about 10 mi. from the Abyssinian and 1½ mi. from the Arabian shore. It has been held by Great Britain since 1857, and is under the government of Aden. It is of consequence from its commanding position, which renders it the key of the Red Sea. On its southwest side is a well-sheltered harbor capable of containing a fleet of warships. Area 7 sq. mi.; pop. (including garrison) 150.

Periodicals, publications which appear at regular intervals, and whose principal object is not the conveyance of news (the main function of newspapers), but the circulation of information of a literary, scientific, artistic, or miscellaneous character, as also criticisms on books, essays, poems, tales, etc. Periodicals exclusively devoted to criticism are generally called *reviews*, and those whose contents are of a miscellaneous and entertaining kind *magazines;* but there is no great strictness in the use of the terms. The first periodical was published in France, being a scientific magazine, the *Journal des Savants*, issued in 1665, and still existing in name at least. The most famous French literary periodical is the *Revue de Deux Mondes*, begun in 1829, from 1831 issued fortnightly, and marked by an ability which has placed it in the front rank of the world's periodicals. Into it tales, poems, etc., are admitted, and the names of the contributors have to be attached to their articles. The earliest English periodical seems to have been the *Weekly Memorials for the Ingenious;* the first number of which is dated January, 1681–82, and which lasted but a year. It was followed by several other periodicals, which for the most part had but a brief existence. In the last century a number of monthly reviews appeared, including the *Monthly Review* (1749–1844); the *Critical Review* (1756–1817); the *British Critic* (1793–1843); the *Anti-Jacobin Review and Magazine* (1798–1821). The most popular American reviews and magazines of our times are *Munsey's Magazine;* the *North American Review* (1815), now monthly, *Harper's Monthly Magazine*, the *Atlantic Monthly*, *Lippincott's Magazine*, *Scribner's Magazine*, *Century Magazine*, *The Cosmopolitan*, *Belford's Magazine*, *Popular Science Monthly*, *Catholic World*, *Forum*.

Peripatetic Philosophy, the philosophy of

Aristotle and his followers, so called, it is believed, because he was accustomed to walk up and down with his more intimate disciples, while he expounded to them his doctrines. The philosophy of Aristotle starts from his criticism of the Platonic doctrine of ideas, in combating which he is led to the fundamental antithesis of his philosophy, that between matter and form. The notion or idea of a thing is not, he says, a separate existence different from the thing itself, but is related to the thing only as form to matter. Every sensible thing is a compound of matter and form, the matter being the substance of which the thing consists, while the form is that which makes it a particular thing (a stone, for example, and not a tree), and therefore the same as its notion or idea. The form is the true nature of a thing. Origination is merely matter acquiring form, it is merely a transition from potential to actual existence. Everything that actually exists previously existed potentially in the matter of which it is composed. Matter is thus related to form as potentiality to actuality. And as there is, on the one hand, formless matter, which is mere potentiality without actuality, so, on the other hand, there is pure form which is pure actuality without potentiality. This pure form is the eternal Being, styled by Aristotle the first or prime mover. The whole of nature forms a scale rising from the lower to the higher of these extremes, from pure matter to pure form, and the whole movement of nature is an endeavor (incapable of realization) of all matter to become pure form. Motion is the transition from the potential to the actual. Space is the possibility of motion. Time is the measure of motion. According to his physical conception the universe is a vast sphere in constant motion, in the center of which is our earth. On this earth, as in all nature, there is a regular scale of beings, the highest of which is man, who, to nutrition, sensation, and locomotion, adds reason. The soul, which is merely the animating principle of the body and stands to the body in the relation of form to matter, cannot be thought of as separated from the body; but the reason is something higher than that, and as a pure intellectual principle exists apart from the body, and does not share in its mortality. Practical philosophy is divided by Aristotle into ethics, economics, and politics. According to his ethical system the highest good is happiness, which depends on the rational or virtuous activity of the soul throughout life. Virtue is proficiency in willing what is conformed to reason. All virtues are either ethical or dianoetic. The former include justice or righteousness, generosity, temperance, bravery, the first being the highest. The dianoetic virtues are reason, science, art, and practical intelligence. For the attainment of the practical ends of life it is necessary for a man to live in society and form a state.

The school of Aristotle (the Peripatetic school) continued at Athens uninterruptedly till the time of Augustus. Those who proceeded from it during the first two or three centuries after his death abandoned, for the most part, the metaphysical side of Aristotle's teaching, and developed chiefly his ethical doctrines, or devoted themselves to the study of natural history. Later Peripatetics again returned to the metaphysical speculations of their master, and many of them distinguished themselves as commentators on his works. No one of the philosophical schools of antiquity maintained its influence so long as the Peripatetic. The philosophy of the Arabians was almost exclusively Aristotelianism, that of the schoolmen (scholasticism) was also based on it, and even down to modern times its principles serve as the rule in philosophical inquiries.

Per'istyle, in architecture, a range of columns surrounding the exterior or interior of anything, as the cella of a temple. It is frequently but incorrectly limited in signification to a range of columns round the interior of a place, as an open court.

Peritone'um, the serous membrane lining the abdominal cavity and covering the intestines. Like all other serous membranes, the peritoneum presents the structure of a closed sac; one layer (*parietal*) lining the abdominal walls, the other or *visceral* layer being reflected over the organs of the abdomen. A cavity — the *peritoneal cavity* — is thus enclosed between the two layers of the membrane, and this contains in health a quantity of serous fluid just sufficient to moisten its surfaces.

Perjury, the act or crime of willfully making a false oath in judicial proceedings in a matter material to the issue or cause in question. Perjury is a misdemeanor punishable at common law, by fine or imprisonment. Popularly, the mere act of making a false oath, or of violating an oath, provided it be lawful, is considered perjury.

Pernambu'co, a town in Brazil, capital of the province of the same name, on the east coast. It consists of three distinct parts: Recife, occupying a small peninsula; San Antonio, on an island; and Boa Vista, on the mainland, the three parts being connected by iron bridges. Recife is the principal seat of business. In it are the customhouse, the exchange, a marine arsenal, etc. San Antonio has broad streets and many fine houses, and contains the episcopal palace, the theater, the military arsenals, etc. Boa Vista is the fashionable residential quarter. The harbor is formed by the reef, which encloses a belt of water about a mile in breadth. The trade is extensive. The principal exports are sugar and cotton; and the chief imports Manchester goods and hardware. Pernambuco was founded by the Portuguese in the sixteenth century. From 1630 to 1654 it was in the hands of the Dutch, under whom it prospered greatly. It is now the third largest city in Brazil, and the second in point of commercial importance. Pop. 130,000. The province has an area of 49,625 sq. mi. The principal cultivated crops are the sugar cane and cotton. It is chiefly the coast districts that are cultivated. The interior is either pasture land or covered with forests yielding valuable timber, including

Brazil wood, often called Pernambuco wood. Pop. 1,110,831.

Perpetual Motion, motion that, once originated, continues forever or indefinitely. The problem of a perpetual motion consists in the invention of a machine which shall have the principles of its motion within itself, and numberless schemes have been proposed for its solution. It was not till the discovery of the conservation of energy, experimentally proved by Joule, that the impossibility of the existence of a perpetual motion was considered to be a physical axiom. This principle asserts that the whole amount of energy in the universe, or in any limited system which does not receive energy from without, or part with it to external matter is invariable. But every machine when in action does a certain amount of work, if only in overcoming friction and the resistance of the air, and as the perpetual motion machine can start with only a certain amount of energy, this is gradually used up in the work it does. A machine, in short, would be required in which there was no friction, and which met with no resistance of any kind. The mechanical arrangements which have been put forward as perpetual motions by inventors are either, 1, systems of weights, which are allowed to slide on a wheel into such positions relatively to the axis of the wheel as to produce a constant turning movement in one direction; 2, masses of liquid moving in wheels on the same principle; 3, masses of iron arranged on the same principle, but subjected to the attractions of magnets instead of their own weights. Numbers of patents for such machines are constantly being applied for, but as perpetual motion is regarded as utterly impracticable no patents are granted for such claims.

Perpignan (per-pēn-yäṇ), a city of Southern France, capital of dep. Pyrénées-Orientales, on the Têt, about 7 mi. from the Mediterranean. Guarding the entrance from Spain into France by the East Pyrenees, it is strongly fortified, has a citadel and other works, and ranks as a fortress of the first class. The principal building is the cathedral. Perpignan was formerly the capital of the county of Roussillon, was long under Spanish rule, and was not united to France till the Treaty of the Pyrenees in 1659. Pop. 29,876.

Perry, Oliver Hazard (1785–1819), an American naval officer, b. at South Kingston, R. I., is famous for his defeat of a British force on Lake Erie in 1813. Perry, who had nine vessels, with 54 guns and 492 officers and men, fought six vessels, with 63 guns and 502 officers and men, lost four fifths of the crew of his flagship, and finally won a complete victory, which he announced in the brief dispatch: "We have met the enemy, and they are ours—two ships, two brigs, one schooner, and one sloop." Perry d. of yellow fever at Trinidad, and was buried at Newport, R. I., where there is a bronze statue (1885).

Persecutions, the name usually applied to periods during which the early Christians were subjected to cruel treatment on account of their religion. Ten of these are usually counted. The *first persecution* (64–68) was carried on under Nero. The cruelties practised on this occasion are worthy of the ferocious instincts of that notorious tyrant. The apostles Peter and Paul suffered in this persecution. The *second persecution* (95–96) was raised by the Emperor Domitian. Many eminent Christians suffered; and it is generally held that St. John was exiled to Patmos at this time. The *third persecution* began in the third year of Trajan (100). This persecution continued for several years, with different degrees of severity in many parts of the empire, and the severity of it appears from the great number of martyrs mentioned in the old martyrologies. The *fourth persecution*, under Marcus Aurelius (161–180), at different places, with several intermissions and different degrees of violence, continued the greatest part of his reign. It raged with particular fury in Smyrna and Lyons, and Vienne in Gaul. Polycarp and Justin Martyr are famous victims of this period. The *fifth* began in 197 under Severus. During the *sixth persecution*, under Maximian (235–238), only Christian teachers and ministers were persecuted. Decius began his reign (249) with a persecution of the Christians (the *seventh*) throughout his dominions. This was the first really general persecution. Valerian in 257 put to death few but the clergy (*eighth persecution*); and the execution of the edict of Aurelian against the Christians (274)—the *ninth persecution*, as it was called—was prevented by his violent death. A severe persecution of the Christians (the *tenth*) took place under the Emperor Diocletian (303). Throughout the Roman Empire their churches were destroyed, their sacred books burned, and all imaginable means of inhuman violence employed to induce them to renounce their faith. Persecutions, principally directed against the clergy, continued with more or less vigor until Constantine the Great (312 and 313) restored to the Christians full liberty and the use of their churches and goods; and his conversion to Christianity made it the established religion in the Roman Empire.

Perseph'onē, in Greek mythology, the daughter of Zeus and Dēmētēr (Ceres). While she was gathering flowers near Enna in Sicily Pluto carried her off to the infernal regions, with the consent of Zeus, and made her his wife, but in answer to the prayers of Dēmētēr she was permitted to spend the spring and summer of each year in the upper world. In Homer she bears the name of Persephoneia. The chief seats of the worship of Persephonē were Attica and Sicily. In the festivals held in her honor in autumn the celebrants were dressed in mourning in token of lamentation for her being carried off by Pluto, while at the spring festivals they were clad in gay attire in token of joy at her return. In works of art Persephonē is sometimes represented as sitting by the side of her husband, and sometimes alone.

Persep'olis, a Persian city of great antiquity, famous for its magnificent ruins, situated in a

fertile valley of the present prov. Farsistan. Its foundation is generally ascribed to Cyrus, but its history is involved in much doubt. It was one of Persia's capitals, and the place of burial for many of its monarchs. The remains of large marble columns, vast portals, walls, huge figures, bas reliefs, etc., amply prove the former magnificence of its royal palace and temples.

Perseus (per'sūs), an ancient Greek hero, son of Danaë and Zeus. He was set adrift in the sea on his birth, in a chest along with his mother. But the chest reached the Island of Seriphos, and Perseus was brought up by the king of the island, who exacted a promise from him to fetch the head of the Gorgon Medusa. This he accomplished under the guidance of Hermes and Athena, and with the assistance of the nymphs. He also delivered Andromeda from a sea monster, an exploit which is frequently figured in ancient art. He was king of Tiryns and founder of Mycenæ. After his death Perseus was worshiped as a hero, and placed among the stars.

Perseus, the last king of the Macedonians, and an illegitimate son of Philip V, succeeded his father B.C. 178, and entered keenly into the hostilities which had previously broken out against Rome. The Romans sent an army against him and gained a signal victory at Pydna 168 B.C. Perseus fled to Samothrace, but was given up to the Romans, and some years after d. in captivity at Alba, near Rome.

Persia (Persian *Iran*), a kingdom of Western Asia; bounded n. by Transcaucasian Russia, the Caspian, and Russian Central Asia; e. by Afghanistan and Beloochistan; s. by the Persian Gulf; and w. by Asiatic Turkey; extending for 700 mi. from north to south, and 900 mi. from east to west; area about 636,000 sq. mi.; pop. estimated 1901, 9,500,000. The country is divided into 27 provinces; capital Teheran (pop. 150,000 to 200,000); chief trade centers, Teheran, Tabreeze, Ispahan; chief ports, Bushire and Bender Abbas on the Persian Gulf. Other large towns are: Meshed, Balfroosh, Kerman, Yezd, Hamadān, Shirāz, Kazvin, Kom, Resht.

Physical Features.—Persia may be considered as an elevated plateau, broken by clusters of hills or chains of rocky mountains, which alternate with extensive plains and barren deserts; the desert of Khorassan in the northeast alone absorbs about one seventh of the entire area. Low tracts exist on the Persian Gulf and the Caspian. The interior plains have an elevation of from 2,000 to 6,000 ft. above the sea. This vast central plateau is supported in the north and south by two great mountain chains or systems, and from these all the minor ranges seem to spring. The north chain, an extension of the Hindu Kush, enters Persia from Northern Afghanistan, proceeds across the country, and reaches its greatest elevation on the south of the Caspian, where it takes the name of the Elburz Mountains, and attains in Mount Demavend a height of nearly 20,000 ft. Still farther west it becomes linked with the mountains of Ararat. The other great mountain system runs from northwest to southeast nearer the Persian Gulf, is of considerable width and forms several separate ranges. In one of these an elevation of 17,000 ft. is reached. The rivers are few and insignificant. Not one of them is of any navigable importance, except the Euphrates, which only waters a small portion of the southwest frontier, and the Karun, recently opened to the navigation of the world. The latter is entirely within Persian territory, and flows into the Shat-el-Arab, or united Tigris and Euphrates. Of the streams which flow northward into the Caspian the only important one is the Kizil-Uzen (or Sefid Rud) (White River), which has a course of about 350 mi. There are a great number of small fresh-water lakes, and a few very extensive salt lakes, the largest being Urumiah in the extreme northwest.

Climate, Products, etc.—The climate varies considerably in different provinces, and in the central plateau intense summer heat alternates with extreme cold in winter. The shores of the Persian Gulf are scorched up in summer; those of the Caspian Sea, especially the parts covered with dense forest, are humid, but also noted for malaria. The mineral wealth of Persia is but little developed. Iron, copper, lead, antimony, are abundant; sulphur, naphtha, and rock-salt unlimited; coal also exists. The turquoise mines of Nishapur are about the only ones receiving anything like adequate attention. The interior of Persia, particularly its eastern and southern regions, is mostly devoid of vegetation over large areas; the southwest has its forests of stunted oaks and other trees, and jungle; but on the Caspian the mountain sides are covered with dense and magnificent woods of oak, beech, elm, and walnut, intermingled with box-trees, cypresses, and cedars. Lower down wheat and barley are extensively cultivated. In the level and rich plains below the sugar cane and orange come to perfection; the pomegranate grows wild; the cotton plant and mulberry are extensively and successfully cultivated, and large tracts are occupied by the vine, and orchards producing every kind of European fruit. In the low plains the only grain under extensive and regular culture is rice; the principal subsidiary crops are cotton, indigo, opium, sugar, madder, and tobacco. Excellent dates are produced on the southern coast tracts. Irrigation is well understood and extensively practised. The domestic animals are, sheep, chiefly of the large-tailed variety; goats, some of which produce a wool little inferior to that of Cashmere; asses and mules of a large and superior description; horses of Arab, Turkoman, and Persian breeds, and camels. Wild animals include the lion, leopard, wolf, jaćkal, hyena, bear, porcupine, wild ass, gazelle, etc.

Manufactures and Trade.—The manufactures of Persia were once celebrated, but excepting some carpets and shawls it may be said that the country has ceased to export manufactured articles. Its chief exports now are rice, dried fruits, opium, silk, wool, cotton, hides, pearls,

and turquoises. Chief imports: textiles, china and glass, carriages, sugar, tea, coffee, petroleum, drugs, and fancy articles. The internal trade of the country is almost entirely carried on by caravans. In 1888 the first Persian railway was opened connecting the Caspian with Teheran. A projected railway includes a line from Resht to Teheran with ultimate extension to the Persian Gulf. There are some 4,000 mi. of telegraph lines in operation, and a regular postal service was organized in 1877.

Government.—The government of Persia is an absolute monarchy. The only control to which its ruler, the shah, is subject are the precepts of the Koran. He surrounds himself with a certain number of advisers, forming a ministry, eleven of whom are heads of special departments. These ministers he calls and dismisses at pleasure. The revenue, chiefly derived from land and poll taxes, import and export duties, transit duties on telegrams, tributes from nomadic tribes, etc., is estimated at $8,750,000 (about one sixth from customs); there is no public debt. An army of some 100,000 is being reorganized under foreign officers.

People.—The population is chiefly made up of Iranians or pure Persians and Turanians (Turkish and Tartar tribes), and in religion belongs almost exclusively to the Shiah sect of Mohammedans, or more properly to a subdivision of that sect. The priesthood is very influential and very bigoted. Education is comparatively well attended to, Persia being considered, next to China, the best educated country in Asia. The Persians are rather short and slender built, fair in complexion, hair long and straight, but beard bushy, and almost invariably jet black. The women are beautiful, intellectual, and polite. The Persian is celebrated for his affable manners, but also for his craft and deceit. Polygamy is both authorized and encouraged.

History.—The original country of the Persians occupied a small portion of modern Persia on the north of the Persian Gulf. After being under the Assyrians, and next under the Medes, Cyrus (B.C. 559–529), by conquering and uniting Media, Babylonia, Lydia, and all Asia Minor, became the founder of the Persian Empire. The empire was further extended by his son and successor Cambyses (B.C. 529–522), who conquered Tyre, Cyprus, and Egypt; and by Darius I, who subdued Thrace and Macedonia, and a small part of India. His son Xerxes (486–465 B.C.) reduced Egypt, which had revolted under his father, and also continued the war against the European Greeks, but was defeated on the field of Marathon and at Salamis (480 B.C.), and obliged to defend himself against their attacks in a disastrous war. Artaxerxes I (B.C. 465–425) had a long and comparatively peaceful reign. Artaxerxes was followed by Darius II, or Darius Nothus, Artaxerxes II (Mnemon), Artaxerxes III (Ochus), and Darius III (Codomannus (B.C. 338–330), the last of this dynasty, known as the Achæmenian dynasty. He was defeated by Alexander the Great in three battles, lost his life, and the empire passed into the hands of his conqueror. On the dissolution of the Macedonian Empire, after the death of Alexander (323), Persia ultimately fell to his general Seleucus, and his successors the Seleucidæ (312). They reigned over it till 236 B.C., when the last Seleucus was defeated and taken prisoner by Arsaces I, the founder of the dynasty of the Arsacidæ and of the Parthian Empire, of which Persia formed a portion, and which lasted till 226 A.D. The supremacy was then recovered by Persia in the person of Ardishir Babigán (Artaxerxes), who obtained the sovereignty of all Central Asia, and left it to his descendants the Sasanidæ, so called from Sassan, the grandfather of Ardishír. This dynasty continued to reign for about 417 years under 26 sovereigns. The reign of Sapor II, called the Great (310–381), and that of Chosroes I (Khosru, 531–579), were perhaps the most notable of the whole dynasty. The latter extended the Persian Empire from the Mediterranean to the Indus, from the Jaxartes to Arabia and the confines of Egypt. He waged successful wars with the Indians, Turks, Romans and Arabs. Chosroes II (591–628), made extensive conquests, but lost them again in the middle of the reign of the Byzantine Emperor Heraclius. His son Ardishír (Artaxerxes) III, but seven years old, succeeded him, but was murdered a few days after his accession. He was the last descendant of the Sasanidæ in the male line. Numerous revolutions now followed, until Yezdigerd III, a nephew of Chosroes II, ascended the throne in 632 at the age of sixteen. He was attacked and defeated by Caliph Omar in 639–636, and Persia became for more than 150 years a province of the Mohammedan Empire. The Arab conquest had a profound influence on Persian life as well as on the language and religion. The old Persian religion was given up in favor of Mohammedanism, only the Guebres remaining true to the faith of their fathers.

About the beginning of the ninth century the Persian territories began to be broken up into numerous petty states. The Seljuks, a Turkish dynasty, who first became powerful about 1037, extended its dominions over several Persian provinces, and Malek-Shah, the most powerful of them, conquered also Georgia, Syria, and Asia Minor. Through Genghis Khan the Tartars and Mongols became dominant in Persia about 1220, and they preserved this ascendency till the beginning of the fifteenth century. Then appeared (1387) Timurlenk (Tamerlane) at the head of a new horde of Mongols, who conquered Persia and filled the world from Hindustan to the extremities of Asia Minor with terror. But the death of this famous conqueror in 1405 was followed not long after by the downfall of the Mongol dominion in Persia, where the Turkomans thenceforward remained masters for 100 years. The Turkomans were succeeded by the Sufi dynasty (1501–1736). The first sovereign of this dynasty, Ismail Sufi, pretended to be descended from Ali, the son-in-law of Mohammed. He assumed the title of shah, and introduced the sect of Ali (the Shiite or Shiah

sect). The great Shah Abbas (1587–1628) introduced absolute power, and made Ispahan his capital. Under Shah Soliman (1666–94) the empire declined, and entirely sunk under his son Hussein. A period of revolts and anarchy followed until Kuli Khan ascended the throne in 1736 as Nadir Shah, and restored Persia to her former importance by successful wars and a strong government. In 1747 Nadir was murdered by the commanders of his guards, and his death threw the empire again into confusion. Kerim Khan, who had served under Nadir, succeeded after a long period of anarchy, in making himself master of the whole of Western Iran or modern Persia. He died in 1779. New disturbances arose after his death and continued till a eunuch, Aga Mohammed, a Turkoman belonging to the noblest family of the tribe of the Kajars, and a man of uncommon qualities, seated himself on the throne, which he left to his nephew, Baba Khan. The latter began to reign in 1796 under the name of Futteh Ali Shah, and fixed his residence at Teheran. This monarch's reign was in great part taken up with disastrous wars with Russia and Turkey. In 1813 he was compelled to cede to Russia all his possessions north of Armenia, and in 1828 his share of Armenia. Futteh Ali died in 1834, leaving the crown to his grandson Mehemet Shah, during whose reign Persia became constantly weaker, and Russian influence in the country constantly greater. He died in 1848, and was succeeded by his son Nassr-ed-Din, the present shah, b. 1829. He has had to suppress a number of insurrections, and in 1851 a serious rebellion of the pure Persian party in Khorassan, who refused obedience to the Kajar dynasty on religious grounds. In May, 1852, he annexed the Sultanate of Herat, but was compelled to relinquish it by the British, and a second occupation in 1855 resulted in the landing of a British force on the Persian Gulf, the capture of Bushire, and the Peace of Paris (March 3, 1857). Persia has since come into the possession of portions of territory formerly belonging to Omân, Afghanistan, and Beluchistan. On the northeast the boundary between Persia and the Russian territory beyond the Caspian, after remaining long uncertain, was settled in the end of 1881, the lower course of the river Atrek, and farther east certain mountain ridges north of that river, forming the new boundary line. The shah visited the various European courts in 1873 and 1889.

Language and Literature.—Iranian is the name now usually given to all forms of the Persian language, which belongs to the great Indo-European or Aryan division of languages. The oldest form of the language is called Old Bactrian or Zend. It is that in which the Zendavesta (or sacred Zoroastrian writings — see *Zendavesta*) was originally composed, and is very closely allied to the Old Sanskrit of the Vedas. The next development of the Iranian language is the Old Persian of the cuneiform inscriptions of the Achæmenian dynasty. We then lose sight of the Iranian language, and in the inscriptions and coins of the Sassanian kings, and in the translations of the Zendavesta made during the period of their sway in Persia, we find a language called Pehlevi or Pehlvi, which is strictly merely a mode of writing Persian, in which the words are partly represented by their Semitic equivalents. This curious disguised language is also known as *Middle Persian*. *New Persian* was the next development, and is represented in its oldest form in the Shanameh of Firdusi (about 1000 A.D.). In its later form it is largely mingled with Arab words and phrases, introduced with Mohammedanism after the Arab conquest. The written character is the Arabic, but with four additional letters with three points. The Persians possess rich literary treasures in poetry, history, and geography, but principally in the former. Among the most brilliant of Persian poets are: Rudagi, a lyric and didactic poet (flourished about 952), regarded as the father of modern Persian poetry; the epic poet Firdusi (beginning of eleventh century), whose most celebrated work is the poetical history the *Shanameh* (*Book of Kings*) in 6,000 couplets; Omar Khayyam (d. 1123), the author of celebrated "*Quatrains*," Nisâmi (twelfth century), a didactic poet; Sadi (thirteenth century), a lyric and moral poet, author of the *Gulistan or Rose Garden*, a collection of stories; Rumi, his contemporary, a great mystic and didactic writer, etc.; Hafiz (b. about the beginning of the fourteenth century), the most celebrated writer of odes; Jami (fifteenth century), one of the most productive and most captivating of Persian poets. In the sixteenth century literary production almost ceased. Kaani, poet laureate to the present shah, has written poetry of no little merit. The Persians are remarkable as being the only Mohammedan nation which has cultivated the drama. Their productions in this province of literature closely resemble the mysteries of the Middle Ages, and abound in natural and affecting lyrical passages. Not less numerous are the prose fables, tales, and narratives, many of which have been translated into English, French, German, and other European languages. It was also through the Persian that much of the Indian literature in fables and tales was transmitted to the Arabs, and thence to Europe. In the departments of history, geography, and statistics the Persians have some large and valuable works. Tabari is the earliest historian (d. 922 A.D.). Mirkhond, who flourished in the fifteenth century, wrote a voluminous work on the *History of Persia down to 1471*. Geometry and astronomy were also cultivated with ardor by the Persians, but their knowledge on these subjects is in a great measure borrowed from the Arabians. Religious works are also numerous; besides those treating of Mohammed and Mohammedan religion, they have translations of the Pentateuch and the Gospels. The Persians have also translated many works belonging to old Indian literature, among others the epics *Ramayana* and *Mahabharata*, besides the abridgment of the *Vedas*. They have also paid great attention to their own language; of this the number of lexi-

cographical and grammatical works extant affords abundant proof.

Persian Gulf, a gulf separating Persia from Arabia, and communicating with the Indian Ocean by the Strait of Ormuz, 35 mi. wide; greatest length 560 mi.; medium breadth 180 mi. It receives the waters of the united Euphrates and Tigris, and of a number of small streams; the principal port is Bushire. There are many islands in the gulf; the largest are, Kishim, Ormuz, and the Bahrein Isles; in the neighborhood of the latter there are lucrative pearl fisheries.

Persian Wheel (or Noria), the *Puisaro* of the south of France, a machine for raising water to irrigate gardens, meadows, etc., employed from time immemorial in Asia and Africa, and introduced by the Saracens into Spain and other European countries. It consists of a double water wheel, with float boards on one side and a series of buckets on the other, which are movable about an axis above their center of gravity. The wheel is placed in a stream, the water turns it, and the filled buckets ascend; when they reach the highest point, their lower ends strike against a fixed obstacle, and the water is discharged into a reservoir. In Portugal, Spain, South of France, and Italy, it is extensively used, and has been modified to enable it to draw water also from ponds and wells, animals supplying the motive power, and pots, leather or other bags taking the place of buckets.

Persigny (per-sēn-yē), Jean Gilbert Victor Fialin, Duc de (1808–1872), French statesman. He instigated and took part in the military rising at Strasburg in 1836, and was arrested, but escaped. In 1840 he shared Napoleon's expedition to Boulogne, was again captured, and for a time kept in confinement. On the outbreak of the revolution of February, 1848, he hastened to Paris, contributed largely to determine the vote by which Napoleon was elected president (Dec. 10, 1849), and was also one of the most prominent actors in the *coup d'état*, by which he became Napoleon III. He held the office of minister of the interior from 1852–54, and again from 1860–63; was appointed member of the senate 1852, ambassador to Great Britain 1855. He was elevated to the rank of duke in 1863.

Persim'mon, the fruit of a tree inhabiting the Southern states, where it attains the height of 60 ft. or more. The fruit is succulent, reddish, and about the size of a small plum, containing a few oval stones. It is powerfully astringent when green, but when fully ripe the pulp becomes soft, palatable, and very sweet.

Personal Actions, in law, are actions brought for the specific recovery of goods and chattels, or for the redress of breaches of contract or other injuries, in contradistinction to *real actions*, brought for the recovery of lands, tenements, and other heritable property.

Personality (or Personal Property), movables; chattels; things belonging to the person, as money, jewels, furniture, etc., as distinguished from *real* estate in lands and houses.

Perspec'tive, the art or science which teaches how to produce the representation of objects on a flat surface so as to affect the eye in the same manner as the object or objects themselves when viewed from a given point. Perspective is intimately connected with the arts of design, and is particularly necessary in the art of painting, as without correctness of perspective no picture can be entirely satisfactory. Perspective alone enables us to represent foreshortenings with accuracy, and it is requisite in delineating even the simplest positions of objects. That part of perspective which relates to the form of the objects differs essentially from that which teaches the gradation of colors according to the relative distance of objects. Hence perspective is divided into *mathematical* or *linear perspective*, and the perspective of color or *aerial perspective*. The contour of an object drawn upon paper or canvas represents nothing more than such an intersection of the rays of light sent from the extremities of it to the eye, as would arise on a glass put in the place of the paper or canvas. Suppose a spectator to be looking through a glass window at a prospect without, he will perceive the shape, size, and situation of every object visible upon the glass. If the objects are near the window the spaces they occupy on the glass will be larger than those occupied by similar objects at a greater distance; if they are parallel to the window, their shapes upon the glass will be parallel likewise; if they are oblique, their shapes will be oblique; and so on. As the person alters his position, the situation of the objects upon the window will be altered also. The horizontal line, or line corresponding with the horizon, will in every situation of the eye be upon a level with it, that is, will seem to be raised as far above the ground upon which the spectator stands as his eye is. Now suppose the person at the window keeping his head steady draws the figure of an object seen through it upon the glass with a pencil, as if the point of a pencil touched the object, he would then have a true representation of the object in perspective as it appears to his eye. Representations of objects have, however, generally to be drawn on opaque planes, and for this purpose rules must be deduced from optics and geometry, and the application of these rules constitutes what is properly called the art of perspective. Linear perspective includes the various kinds of *projections*. *Scenographic* projections represent objects as they actually appear to the eye at limited distances. *Orthographic* projections represent objects as they would appear to the eye at an infinite distance, the rays which proceed from them being parallel instead of converging. It is the method on which plans and sections are drawn. A *birds-eye view* is a scenographic or orthographic projection taken from an elevated point in the air from which the eye is supposed to look down upon the objects. *Aerial perspective* teaches how to judge of the degree of light which objects reflect in proportion to their distance, and of the gradation of their tints in proportion to the intervening air.

By its application each object in a picture receives that degree of color and light which belongs to its distance from the spectator. The charm and harmony of a picture, particularly of a landscape, depend greatly upon correct aerial perspective.

Perth, a city and royal and parliamentary burgh of Scotland, capital of the county of the same name, on the right bank of the Tay, and at the common junction of railways from Dundee, Aberdeen, Glasgow, Edinburgh, and Inverness.

Perth, capital of Western Australia, on the Swan River, 12 mi. above its port, Freemantle (at the mouth of the Swan River, pop. 4,000). It was founded with the Swan River Settlement in 1829, is well laid out, with broad streets, and has some good buildings. Pop. 9,617.

Perth Amboy, Middlesex co., N. J., 21 mi. s.w. of New York. Railroads: Penna. & Lehigh Valley; New Jersey Central; Staten Island. In the vicinity are deposits of fire clay and kaolin. Industries include fire brick works, cork, terra cotta, white ware, and drain-pipe factories. Pop. 1900, 17,699.

Perturbations, the orbital irregularities or deviations of the planets from their regular elliptic orbits. These deviations arise, in the case of the primary planets, from the mutual gravitations of these planets toward each other, which derange their elliptic motions round the sun; and in that of the secondaries, partly from the mutual gravitation of the secondaries of the same system, similarly deranging their elliptic motions round their primary, and partly from the unequal attraction of the sun on them and on their primary.

Peru, Miami co., Ind., on Wabash River, 75 mi. n. of Indianapolis. Railroads: L. E. & W.; Wabash main line, and junction of main line of Wabash and Detroit line of Wabash. Industries: three flouring mills, two iron foundries, woolen mill, bagging mills, railroad shops, electrical works, etc. Gas in vicinity. Surrounding country agricultural. The town was first settled in 1834 and became a city in 1867. Pop. 1900, 8,463.

Peru′, a republic of South America, bounded on the n. by Ecuador, on the w. by the Pacific Ocean, on the s. by Chile, and on the e. by Bolivia and Brazil; area 695,733 sq. mi.; the official pop. in 1890 was 2,970,000. The population consists of about 57 per cent. aboriginal Indians, 23 per cent. mixed Indian races, and 20 per cent. of descendants of Spaniards, Europeans (chiefly Italians, French, and Spaniards), and Asiatics (chiefly Chinese). Principal towns: Lima, the capital; Arequipa, Cuzco, and Truxillo; principal ports, Callao (port of Lima), Mollendo (port of Arequipa), and Truxillo. Pop. 1901, est. 1,500,000 to 4,700,000.

Physical Features.—This country exhibits great varieties of physical character. It is traversed throughout its length by the Andes, running parallel to and on an average 60 mi. distant from the coast, the region between largely consisting of sandy desert, except where watered by transverse mountain streams. The Andes consist here of two main chains or Cordilleras, connected by cross ranges, enclosing extensive and lofty valleys and plateaus. The Andes region is roughly estimated at about two fifths of the entire area of Peru. The loftiest summits are in the southern portion of the West Cordillera; several peaks attain there an altitude of nearly 20,000 ft., and the Chuquibamba rises to 21,000 ft. The country east of the Cordilleras, forming a part of the Amazon basin, and mostly covered by dense forest, is but little known and almost exclusively in possession of the native Indians. It is called Montaña or Los Bosques. The elevated region between the gigantic ridges of the East and West Cordilleras, called Las Sierras, is now the chief, as it was anciently almost the exclusive seat, of the population of Peru. It is partly occupied by mountains and naked rocks, partly by table-lands yielding short grass, and extensive hilly pasture grounds, and partly by large and fertile valleys. The most important districts are those of Pasco, of Cuzco, the valleys of the Rio Jauja, and of the Marañon or Amazon. The first of these lies at one of those points where the branches of the Andes unite, the ridges sinking into an elevated plain, which has here a general height of 14,000 ft. The veins of the precious metals, with which this region abounds, have attracted to it a comparatively dense population. The table-land of Cuzco descends from an elevation of less than 12,000 ft. in the south to about 8,000 ft. in the north. Of the lakes Lake Titicaca (12,542 ft. above sea level) is the largest in South America, and which partly belongs to Bolivia, is the only one of commercial importance. The chief rivers are the Marañon or main stream of the Amazon, and the Huallaga and Ucayale, which join the Marañon; the Ucayale, formed by the united waters of a number of streams (Apurimac, Urubamba, Paucartambo), being about the same size as that river. In the maritime region of Peru earthquake shocks are of common occurrence, and some of them have been of exceptional severity, the most disastrous being those of 1746, 1868, and 1877. Gold and silver occur in all the provinces of Peru, and form the chief wealth of the country. Quicksilver is also abundant. Copper, lead, and iron also exist in various places.

Climate.—The climate of Peru is as varied as its physical aspect. On a portion of the coast no rain has fallen within the memory of man, but the *garua*, a thick heavy mist often accompanied by drizzling rain, is a partial compensation, and the rivers from the Andes afford means of irrigation for sugar and cotton plantations. From November to April the sky is cloudless, and were it not for the cool oceanic currents, and the streams of cold air from the snowy Andes, the heat would be unbearable. Fortunately the rainy seasons in the mountains corresponds with this period. The central plateau region has a mild and comparatively humid climate, but the higher regions are inclement and subject to terrific tempests. East of the Andes the regular equatorial winds from the east come loaded with humidity, and,

checked by the mountains, pour down copious, and in some places perpetual rains.

Plants and Animals.—Peru is incomparably rich in botany, each region having its own flora. In the less elevated portions of the Eastern Andes a tropical vegetation is found; while on the higher parts representatives of Alpine families (as the gentians) luxuriate. In the forests of Eastern Peru cinchona trees grow abundantly and supply the valuable bark from which the quinine is extracted. The same zone, and especially the hot plains and swamps, also supply coca, the medicinal properties of which have for centuries been known to the natives of Peru and Bolivia, who chew the leaves as a stimulant. Tobacco, cotton, sugar, rice, coffee, cocoa, and maize are grown in various parts and in increasing quantities. The eastern face of the Andes is as remarkable for its fauna as it is for its flora. The forests on the lower ranges and in the plains swarm with many species of parrots and monkeys; the tapir, sloth, ant-eater, armadillo, etc., are found here; the rivers are alive with alligators; and in the inundated plains the boa-constrictor attains a huge size. The puma and the South American bear inhabit the higher levels; the llama, the guanaco, the alpaca, and the vicuña, the still more elevated regions.

Commerce.—Peru exports precious metals, silver ores, guano, cubic niter, wool of the llama, alpaca, and vicuña, cotton, sugar, cinchona bark, coca leaves and cocaine, chinchilla skins, and hides. The chief imports are machinery, cotton, woolen, and linen goods, and provisions. The trade of the country has suffered much from revolutions, and more from the disastrous war with Chile (1879–83). The export of guano and cubic niter has naturally declined since the Chileans possessed themselves of the guano deposits of the Lobos Islands, and of the province of Tarapacá, which contains the richest nitrate beds. The total amount of the exports and imports cannot be stated, but in 1901 the exports were estimated at $10 000,000, and the imports at $7,000,000. The internal trade of the country has been fostered by the construction of railways, one of which attains a height of 15,600 ft. in its passage through the Andes, and exhibits remarkable engineering works. Some 2,000 mi. have been constructed at a cost of about $170,000,000, but only about 1,500 mi. are in working order. The chief denomination of money is the *sole*=about 77 cents.

Government, etc.—The government is based on a constitution adopted in 1867, and modeled on that of the U. S. The legislative power is in the hands of a senate and a house of representatives, the senate being composed of two senators from each province, and the house of representatives containing one member for every 20,000 of the population. The president, elected for four years, is the executive. The estimated revenue for 1890 was $4,800,000; the expenditure $4,791,500. Peru has a foreign debt amounting to $273,000,000, including unpaid interest since 1876. In 1890 this debt was settled by transfer of all the railways of the state to the bondholders. There is besides an internal debt of $65,000,000. In Peru the Indian is on a level in political rights with the white man; there exists absolute political but not religious freedom, the constitution prohibiting the exercise of any other religion than the Roman Catholic. There is, however, a considerable amount of tolerance. Education is compulsory and free. There are universities at Lima, Arequipa, and Cuzco. The Peruvian language, of which there are many dialects, still maintains itself alongside of the language of the conquerors.

History.—Of the early history of Peru we are almost entirely ignorant, but existing ruins, spoils secured by the Spaniards, and the descriptions left us by the historians of the Spanish conquest, sufficiently prove that the ancient Peruvians had no mean knowledge of architecture, sculpture, metal work, etc. They also had made considerable progress in astronomical science. The early religion of the Peruvians is bound up in the god Viracocha, the creator of the sun and the stars, and from him the incas or emperors claimed descent as the sons of the sun. Under the incas the empire was divided into four parts, corresponding to the four cardinal points; each division had a separate government, presided over by a viceroy of royal blood. All the land belonged to the inca; and trade was carried on by barter, money being unknown. The thirteenth monarch of the incas was reigning when the Spanish adventurer Pizarro disembarked in Peru in 1531. The inca was taken prisoner (1532), numbers of his subjects were massacred, and the whole country fell in a short time into the hands of the invaders. It was then formed into a Spanish viceroyalty; subsequently part of it was incorporated in New Granada, and the viceroyalty of Buenos Ayres was constructed out of some of the provinces. In 1821 the country proclaimed its independence, but did not obtain actual freedom from Spanish rule until 1824, after a prolonged war. Since then Peru, like the rest of the South American republics, has suffered much from dissensions and revolutions. In the spring of 1879 it joined Bolivia in a war against Chile, resulting in the complete defeat of both the former.

Peru, La Salle co., Ill., on the Illinois River at head of navigation on the Illinois and Michigan Canal. Railroads: C. B. & Q., and C. R. I. & P. Industries: zinc works, plow factories, scale, and pump factories, boiler, foundry, and machine shops, large breweries, etc. Coal is mined and ice made. Pop. 1900, 6,863.

Peru, Miami Co., Ind., on the Wabash R., 75 mi. n. of Indianapolis. R.R.'s: Wabash; Lake Erie and Western; Cincin., Rich. and Muncie. It is the county seat, has a public library and a sanatorium. Industries: railroad shops, carbon works, glass works, steel works, basket factory, woolen mills. Pop. 1900, 8,463.

Perugino (per-ụ-jē′nō), Pietro Vanucci (1446–1523), the founder of the Roman school of painting, b. at Città della Pieve. His easel pictures were done in his earlier practise in tempera, but he afterward became a master in

the oil method. About 1480 Pope Sixtus IV called him to Rome, where he was employed along with Signorelli, Ghirlandaio, Botticelli, and Rosselli in decorating the Sistine Chapel with frescoes. Fine specimens of his frescoes are preserved in Perugia, Rome, Bologna, and Florence, and specimens of his other works are not infrequent in European galleries.

Pesha'war, a town of India, in the Punjab, capital of the division of the same name, 12 mi. e. of the eastern extremity of the Khyber Pass. It covers a large area, is surrounded by a mud wall, and commanded by the Bala Hissar, a fort which crowns an eminence just outside the walls. It has several good mosques, but few architectural attractions. It is favorably situated for commerce, lying in the great route from Bokhara and Cabul to India. The population, including the military cantonment 2 mi. w. of the city proper, is 79,982. The cantonment accommodates a large force, the population in it being about 20,000. The division or commissionership comprises the districts of Peshawar (area 2,504 sq. mi.; pop. 592,674), Hazara, and Kohat, with the control of part of the hill tribes inhabiting the Khyber Pass. Area 8,381 sq. mi.; pop. 1,181,289.

Pessimism, a modern term to denote the opinion or doctrine that maintains the most unfavorable view of everything in nature, and that the present state of things only tends to evil; that in human existence there is an enormous surplus of pain over pleasure, and that humanity can find real good only by abnegation and self-sacrifice. It is antithetical to *optimism*, and as a speculative theory is the work of Schopenhauer and Von Hartmann, though it is preluded in the metaphysics of Brahmanism and the philosophy of Buddhism.

Pestalozzi, Johann Heinrich (1746–1827), a Swiss philanthropist and educational reformer. He first studied theology, then law; and subsequently became concerned in a calico manufactory. Afterward he devoted his time and substance to the children of paupers, whom he collected in large numbers in his own house; and this good work he carried on for over twenty years without outside aid or even sympathy. The want of means at last compelled him to abandon his gratuitous institution, and to seek pupils who could pay for their maintenance and instruction. After a few years' successful teaching in various places he opened a school in the Castle of Yverdun (canton Vaud), which the government had placed at his disposal. His novel *Lienhardt and Gertrud* (1781–89, 4 vols.) exerted a powerful moral influence, while his educational treatises have laid the foundation for the more rational system of elementary instruction which now obtains in Europe. The grand principle that lay at the basis of Pestalozzi's method was that of communicating all instruction by direct appeal to the senses and the understanding, and forming the child by constantly calling all his powers into exercise, instead of making him a mere passive recipient, selecting the subjects of study in such a way that each step should best aid the further progress of the pupil.

Petaluma, Sonoma co., Cal., on Petaluma River, 36 mi. from San Francisco. Industries: silk mills, flouring mills, two iron foundries, woolen mills, incubator factories, farm implement, and harness factories. Surrounding country agricultural and dairy. The town was first settled by the Spanish in 1835, and became a city in 1851. Pop. 1900, 3,871.

Petcho'ra, a river of Russia, rises in the north of the government of Perm, on the western slope of the Ural Mountains, and after a course of about 900 mi. falls into a bay of the Arctic Ocean by a number of mouths.

Peter the Apostle, commonly called Saint Peter, was a Galilean fisherman from Bethsaida. He became the disciple of Christ. His zeal and eloquence made him often the speaker in behalf of his fellow apostles on important occasions, and his opinions had great influence in the Christian churches. Nothing certain is known of his subsequent life, but it is almost beyond doubt that he was a joint founder of the church at Rome, and that he suffered martyrdom there, most likely under Nero.

Peter the Cruel (1334–1369), king of Castile and Leon. He succeeded his father in 1350. His reign was one long series of cruelties and despotic acts. In 1353 he married, though contrary to his will, Blanche of Bourbon, one of the most accomplished princesses of the time, whom, however, he abandoned two days after his marriage in order to rejoin his mistress Maria Padilla. He afterward married the beautiful Juana de Castro, but only to abandon her after a few months. Two revolts against him were unsuccessful.

Peter the Hermit, an enthusiastic monk of Amiens, whose preaching, after a pilgrimage to Jerusalem, gave rise to the first Crusade. Peter led the way through Hungary at the head of an undisciplined multitude of more than 30,000 men, a comparatively small number of whom survived to reach their destination, and distinguished himself by his personal courage at the storming of the holy city. On his return to his native country he founded the abbey of Noirmoutier, and d. its first superior in 1115.

Peter I (the Great), Alexeievitch (1672–1725), emperor of Russia. In 1682 Peter was declared czar, with his mother, the Czarina Natalia Kirilovna, as regent. Sophia, third daughter of Alexis, ambitious to govern, succeeded in having Ivan proclaimed czar jointly with Peter, and herself regent. Peter was relegated to private life, his education purposely neglected, and his bad habits encouraged. In 1689 he wrested the power from his sister, and confined her in a convent. Peter was now virtually sole emperor, though, till the death of his brother in 1697, he associated his name with his own in the ukases of the empire. He now determined to do what he could to raise his country out of its barbarism, and to place its people in the ranks of civilized nations. His journey to Holland and England (1697–98), when he practically worked in shipyards, is familiar; and the knowledge he there gained was amply profited by on his return. Peter,

however, not only created a navy, but gave Russia a sea board and sea ports by wresting the Baltic provinces from Charles XII of Sweden. Young Russian nobles were obliged to travel; schools of navigation and mathematics were founded; agriculture was improved by the introduction of implements, seeds, and superior breeds of cattle. Peter imported foreign artisans of all kinds, established manufactories of arms, tools, and fabrics, and distributed metallurgists through the mining districts of Russia; roads and canals were made to foster internal commerce, and to extend trade with Asia. In 1703 he laid the foundation of St. Petersburg, and twenty years later of its Academy of Sciences. Laws and institutions which in any way interfered with his projects, he either abolished or altered. In his zeal to do good he was too frequently injudicious in choosing times and seasons, and the least show of opposition irritated him into ferocity. He repudiated his wife a few years after marriage for her reactionary leanings; for the same reason his son Alexis was ill treated, compelled to renounce the succession, and condemned to death, but d. suddenly before sentence could be carried out. In 1707 he had married his mistress Catharine; this marriage was publicly celebrated in 1712; Catharine was crowned in 1724, and succeeded Peter after his death.

Peter I, KARAGEORGEVITCH (1846——), King of Servia, born in Belgrade; son of a deposed prince. After 1848 he participated in many wars under foreign flags and finally settled at Geneva, Switzerland. On June 15, 1903, he was elected King of Servia, four days after the murder of King Alexander.

Peter II, ALEXEIEVITCH, emperor of Russia, grandson of Peter the Great and son of Alexis, ascended the throne in consequence of the will of Catharine I, in 1727, when but thirteen years old. He d. in 1730, and was succeeded by Anna Ivanovna.

Peter III, FEODOROWITCH (1728–1762), emperor of Russia, was the son of Anna Petrovna, daughter of Peter the Great and the Duke of Holstein. Peter III ascended the throne in 1762, but on account of his German proclivities and other causes a conspiracy broke out; he abdicated, and was murdered.

Peterborough, a flourishing town of Canada, prov. Ontario, on the river Otonabee, 26 mi. n. of Lake Ontario. It is well built; has manufactures of machinery, agricultural implements, etc., and being a railway center has a good trade. Pop. 9,717.

Peter's, SAINT, the Cathedral of Rome, the largest and one of the most magnificent churches in Christendom. It is a cruciform building in the Italian style, surmounted by a lofty dome, built on the legendary site of St. Peter's martyrdom. In 306 Constantine the Great erected on this spot a basilica of great magnificence. In the time of Nicholas V it threatened to fall into ruins, and he determined on its reconstruction, but the work of restoration proceeded slowly, and Julius II (1503–13) decided on the erection of an entirely new building. He laid the foundation stone of the new cathedral on April 18, 1506, and selected the famous Bramante as his architect. After the latter's death various architects had charge of the work until Michael Angelo was appointed in 1546. He nearly completed the dome and a large portion of the building before his decease (1564). The nave was finished in 1612, the façade and portico in 1614, and the church was dedicated by Urban VIII on Nov. 18, 1626. The extensive colonnade which surrounds the piazza and forms a magnificent approach to the church was begun by Bernini in 1667, and the sacristy erected by Carlo Marchionni in 1780. The interior diameter of the dome is 139 ft., the exterior diameter 195½ ft.; its height from the pavement to the base of the lantern 405 ft., to the top of the cross outside 448 ft. The length of the cathedral within the walls is 613½ ft.; the width 87½ ft. The width of the side aisles is 33¾ ft.; the entire width of nave and side aisles, including the piers that separate them, 197¾ ft. The height of the baldacchino is 94½ ft. The circumference of the piers which support the dome is 253 ft. The floor of the cathedral covers nearly 5 acres, and its cost is estimated to have exceeded $50,000,000.

Petersburg, Dinwiddie co., Va., on Appomattox River. 20 mi. s. of Richmond, Railroads: Norfolk & Western, and Richmond & Petersburg. Industries: cotton and flouring mills, tobacco factories, machinery, agricultural implements, paper manufacture, etc. Pop. 1900, 21,810.

Petition, a representation of grievances with an appeal for redress. The first amendment to the constitution of the U. S. provides that Congress shall make no law abridging the right of the people peaceably to assemble, and to petition the government for a redress of grievances. The right of petition has always been treated as an individual right, whereby the citizen can make his grievances known to the highest authority in the state or union.

Petoskey, Emmet Co., Mich., an attractive summer resort on Little Traverse Bay, an arm of Lake Mich. R.R.: Pere Marquette, G. R. & I. Seat of a normal school; industries: iron foundries, rug and carpet factory. Municipal ownership of light and water plants. Pop. 1900, 5,285.

Petrarch (pet'rârk) (FRANCESCO PETRARCA) (1304–1374), an Italian poet and scholar b. at Arezzo. It was at Avignon in 1327 that he first saw, in the church of St. Claire, the Laura who exercised so great an influence on his life and lyrics. After this first meeting Petrarch remained at Avignon three years, singing his purely Platonic love, and haunting Laura at church and in her walks. He then left Avignon for Lombez, where he held a canonry gifted by Pope Benedict XII, and afterward visited Paris, Brabant, Ghent, the Rhine, etc. In 1337 he returned to Avignon, bought a small estate at Vaucluse, in order to be near Laura, and here for three years wrote numerous sonnets in her praise. It was upon his Latin

scholarship, however, that he rested his hopes of fame. His Latin works were highly esteemed, and in 1341 he was called to Rome to receive the laureate crown awarded for his Latin poem of *Africa*, an epic on the Punic wars. At Parma he learned of the death of Laura, which he recorded on his copy of *Vergil*, and celebrated in his *Triumphs*. A large part of his time was employed in various diplomatic missions, and in 1370 he took up his residence at Arqua, near Padua, where he passed his remaining years in religious exercises.

Petrel, the common name of the web-footed oceanic birds of the family Procellaridæ. The petrels are nocturnal in their habits, breed in holes in the rocks, lay but one egg, and are almost all of small size and more or less sombre plumage. The smaller species are well known to sailors under the name of Mother Carey's chickens, and their appearance is supposed to presage a storm.

Petro'leum, a variety of naphtha, called also rock or mineral oil, a liquid inflammable substance in certain localities exuding from the earth, in some places collected on the surface of the water in wells, in other places obtained in great quantities by boring. It is essentially composed of a great number of hydrocarbons; is unctuous to the touch; exhales a strong odor; flows chiefly from beds associated with coal strata, and is found in enormous quantities in various parts of the U. S., Russia, Canada, Burmah, etc. At Baku a single well is said sometimes to spout as much as 11,000 tons of oil in a single day, the oil rising perhaps to the height of 300 ft. It yields kerosene, paraffin, and paraffin oil, so extensively employed for illuminating purposes; also lubricating oil and vaseline; and has been largely employed as liquid fuel in factories, locomotives, and steamships. Steamers, specially constructed with tanks, are now engaged in its transport. The greatest and most remarkable development of the petroleum wealth began in 1859, when a company "struck oil" by boring at Oil Creek, Pa., and obtained a supply of 400 gallons a day. This led to numerous other borings, and the oil was obtained in such quantities that towns of considerable size soon sprang up in the oil district, railways were constructed, immense reservoirs were made, and long lines of oil pipes laid down, while large fortunes were realized. At first the borings were not very deep, and the oil generally flowed naturally; subsequently deeper borings were necessary, and the oil could only be raised to the surface by pumping. In 1900 the oil fields of Southern California came into prominence, and early in 1901 several large flowing wells or "gushers" were in operation in the region around Beaumont, Texas. The supply from the Texas field is sufficient to have a marked influence on the market. While the oil from these recently discovered fields is not suitable for illuminating purposes, it makes excellent fuel, and is much cheaper than coal in the localities where it is obtained. The Southern Pacific railway is now using the crude oil from the California wells in place of coal on its locomotives. The production of petroleum in the United States has continued to increase since 1859, when it was 2,000 barrels of 42 gallons each, until in 1900 it was 63,000,000 barrels. In 1900 there were 75 refineries in operation, having invested a capital of $95,327,892, and giving employment to over 12,000 wage earners. About 40 per cent of the refined oil is exported.

Pettie, John, R. A., distinguished painter, b. at Edinburgh in 1839; studied there at the Royal Scottish Academy; exhibited *The Prison Pet* (1859) at Edinburgh, and began in the following year to exhibit in London. Remarkable alike for vigorous conception and technical dexterity his historical and *genre* paintings have been numerous.

White Petunia.

Petu'nia, a genus of American herbaceous plants, nat. order Solanaceæ, nearly allied to tobacco. They are much prized by horticulturists for the beauty of their flowers.

Pewter, an alloy of tin and lead, or of tin with proportions of lead, zinc, bismuth, antimony, or copper, and used for domestic utensils. One of the finest sorts of pewter is composed of 100 parts of tin to 17 parts of antimony, while the common pewter of which beer mugs and other vessels are made consists of 4 parts of tin and 1 of lead. The kind of pewter of which teapots are made is an alloy of tin, brass, antimony, and bismuth.

Phræda, in Greek mythology, daughter of Minos, king of Crete, was the sister of Ariadne and wife of Theseus. She falsely accused her stepson, Hippolytus, of a criminal attempt upon her honor, an injustice of which she afterward repented, and was either killed by her husband or committed suicide. Sophocles and Euripides made this the subject of tragedies, and their example was followed by Racine.

Pha'ëthon, a mythological character, who one day obtained leave from his father Helios (the Sun) to drive the chariot of the sun, but being unable to restrain the horses Zeus struck him with a thunderbolt and hurled him headlong into the river Po. The name in its English form of *Phaeton* is applied to an open four wheeled carriage.

Phal'anx, a name given generally by the Greeks to the whole of the heavy armed infantry of an army, but more specifically to each of the grand divisions of that class of troops when formed in ranks and files close and

deep, with their shields joined and their pikes crossing each other. The Spartan phalanx was commonly 8 ft. deep, while the Theban phalanx was much deeper.

Pharaoh (fā′rō), the name given in the Bible to the kings of Egypt, corresponding to the P-RA or PH-RA of the Egyptian hieroglyphics, which signifies the sun. The identification of the Pharaohs mentioned in Scripture with the respective Egyptian kings, particularly the earlier ones, is a matter of great difficulty. See *Egypt.*

Pharisees, a religious sect among the Jews which had risen into great influence at the time of Christ, and played a prominent part in the events recorded in the New Testament. The most probable account of the origin of the Pharisees as a distinct sect is that which refers it to the reaction against the attempt of Antiochus Epiphanes to break down the distinctions between his Jewish and his Greek subjects. At the time of Christ the Pharisees stood as the national party in politics and religion — the opponents of the Sadducees. The fundamental principle of the Pharisees was that of the existence of an oral law to complete and explain the written law. "Moses," says *Mishna,* "received the law (the unwritten law is meant) from Sinai, and delivered it to Joshua, and Joshua to the elders, and the elders to the prophets, and the prophets to the men of the Great Synagogue." This oral law declared the continuance of life after the death of the body, and the resurrection of the dead. This authoritative tradition received in process of time additions which were not pretended to be derived directly from Moses: 1, Decisions of the Great Synagogue by a majority of votes on disputed points. 2, Decrees made by prophets and wise men in different ages. 3, Legal decisions of proper ecclesiastical authorities on disputed questions. These authorities comprehended both the writers of the sacred books and their approved commentators. There is no doubt that though their strict observance of small points often led to hypocrisy and self-glorification, the sect contained a body of pious, learned, and patriotic men of progress.

Phar′macy (Pharmaceutics), the art of preparing, compounding, and combining substances for medical purposes; the art of the apothecary. As these substances may be mineral, vegetable, or animal, theoretical pharmacy requires a knowledge of botany, zoology, and mineralogy; and as it is necessary to determine their properties, and the laws of their composition and decomposition, of chemistry also. In a narrower sense pharmacy is merely the art of compounding and mixing drugs according to the prescription of the physician. In pharmaceutical operations the apothecaries' weight is used, in which 20 grains make a scruple, 3 scruples a drachm, 8 drachms an ounce, and 12 ounces a pound; in fluid measure 60 minims (drops) make 1 fluid drachm, and 8 drachms a fluid ounce. The following abbreviations and signs are used by physicians in writing their prescriptions: ℥, ounce; ʒ, drachm; ℈, scruple; f. ℥, fluid ounce; f. ʒ, fluid drachm; ♏, minim; Gut. (*gutta*), drop; Cochl. (*cochleāre*), spoonful; j. or i., one; ss., half; āā or ana, of each; q. s. (*quantum sufficit*), as much as necessary; p. e., equal parts.

Pharynx (fa′ringks), the term applied to the muscular sac which intervenes between the cavity of the mouth and the narrow œsophagus with which it is continuous. It is of a funnel shape, and about 4 in. in length; the posterior nostrils open into it above the soft palate, while the larynx, with its lid, the epiglottis, is in front and below. The contraction of the pharynx transmits the food from the mouth to the œsophagus. From it proceed the eustachian tubes to the ears.

Pheasant, the general name given to birds which comprise several genera besides that of the pheasants proper. There are usually naked spaces of skin on the head or cheeks and often combs or wattles. The plumage of the males is brilliant, that of the females more sober, and the males carry spurs on the tarsometatarsus. The wings are short, the tail

Male and Female Pheasant.

long. The three front toes are united by a membrane up to the first joint, and the hinder toe is articulated to the tarsus. The food consists of grains, soft herbage, roots, and insects. They are chiefly terrestrial in habits, taking short rapid flights when alarmed. The pheasants are polygamous, the males and females consorting together during the breeding time, which occurs in spring. These birds breed freely in a domesticated state. The pheasant will interbreed with the common fowl, the Guinea fowl, and even with the black grouse, and there are white and pied varieties of the common species. The hybrid produced by the union of a cock pheasant with the common hen is termed a *pero.*

Phelps, Elizabeth Stuart, an American authoress, was b. Aug. 31, 1844, at Andover, Mass., the daughter of Prof. Austin Phelps and of the authoress of *Sunny Side.* Besides lecturing and engaging in work for the advancement of women and for social reforms, she has written a number of stories, including *The Gates Ajar* (1868), which passed through twenty editions in the year of its publication;

Beyond the Gates (1883); *The Gates Between* (1887); *Hedged In* and *The Silent Partner* (1870); *The Story of Avis* (1877); *Doctor Zay* (1884), in which the question of professional life for women is considered; and in 1890, in conjunction with her husband, the Rev. Herbert D. Ward, *Come Forth*, a travesty of the story of Lazarus, and *The Master of the Magicians*.

Phi'dias OF ATHENS, a celebrated Greek sculptor, who was b. about 490 B.C., and flourished in the age of Pericles, but of whose life hardly any particulars are known. Among his works were three statues of Athena which were all in the Acropolis of Athens in the time of Pausanias. One colossal statue of Athena was in bronze, and the goddess was represented as a warrior goddess in the attitude of battle. The second and still more famous stood in the Parthenon, and was made of ivory and gold, representing Athena standing with a spear in one hand and an image of Victory in the other; it measured, with the pedestal, about 41½ ft. in height. The third statue, in bronze, of a smaller size, was called emphatically the *beautiful*, on account of its exquisite proportions. Another colossal statue by Phidias, that of Zeus at Olympia, was ranked for its beauty among the wonders of the world. Zeus was here seen sitting upon a throne, with an olive wreath of gold about his temples; the upper part of his body was naked; a wide mantle, covering the rest of it, hung down in the richest folds to his feet, which rested on a footstool. The naked parts of the statue were of ivory, the dress was of beaten gold. The right hand held a Victory, and the left a scepter tipped with the eagle. The Zeus was removed to Constantinople by Theodosius I, and was destroyed by fire in 475 A.D. During the government of Pericles, which lasted twenty years, Athens was adorned with costly temples, colonnades, and other works of art.

Philadelphia, Philadelphia co., Pa., on Delaware River, the chief city of Pennsylvania and the third of the U. S. Railroads: Pennsylvania; B. & O.; Philadelphia & Reading; and the Lehigh Valley. In the number and variety of its manufactures it is second only to New York, having over 18,000 establishments with an invested capital of $375,000,000, employing over 260,000 hands. Among the more prominent industries may be mentioned the locomotive works, carpet works, cotton mills, sugar refineries sending out 20,000 barrels per day, chemical works and oil refineries; iron and steel products to the amount of $75,000,000 employ 40,000 hands. Philadelphia is the greatest textile center in the U. S. The total area of the city is about 130 sq. m., only one-eighth of which is thickly built, the remainder comprising the small suburban towns within the city limits. Philadelphia is noted as the city of homes, and has more single residences than any other city in the world. The buildings in the older portion of the city are very plain architecturally, but are now relieved by the magnificent City Hall and other modern buildings, among which may be mentioned the Customhouse, the U. S. mint, and the Masonic Temple. Philadelphia is noted for its educational advantages, spending nearly $4,000,000 yearly on its public schools. There are many professional schools and colleges, including law and medical schools. The University of Pennsylvania, founded in 1755, is located here. It has over 2,000 students. Another institution worthy of note is Drexel Institute, with an endowment of $1,000,000. The city is rich in special and reference libraries, the most important being the Pennsylvania Historical Society. There are many parks scattered throughout the city, the largest being Fairmount Park with 3,000 acres. The Centennial Exposition of 1876 was held in this park. Population, 1900, 1,293,697.

Philæ, a small island of the Nile, on the borders of Nubia and Egypt, just above the first cataract, 5 mi. s. of Assouan. It contains some remarkable ruins, among which are temples, obelisks, etc. The most ancient of the temples was erected by Nectanebus I, the last of the native Pharaohs, about 378–360 B.C. There is also a great temple to Isis, built by Ptolemy II, Ptolemy III, and Euergetes, 247–222 B.C. Others are of the times of the Ptolemies and Cæsars.

Philip, one of the twelve apostles, according to John's gospel, of Bethsaida, the city of Andrew and Peter, and who was called to follow Jesus at Bethany. After the resurrection he was present at the election of Matthias to the apostleship, but is not again mentioned. In the Western church he is commemorated on May 1. PHILIP, the Evangelist, often confounded with the above, is first mentioned in Acts 6:5. He preached at Smyrna, where Simon Magus was one of his converts; baptized the Ethiopian eunuch; entertained Paul and his companion on their way to Jerusalem, when "he had four daughters which did prophesy."

Philip II (382–336 B.C.), king of Macedon, the most famous of the five Macedonian kings of this name, was a son of Amyntas II. He succeeded his elder brother Perdiccas in 360. His position at first was not very secure, but as he had few scruples and was a man of the highest talents both for war and diplomacy, in a short time he had firmly established himself, had reorganized the Macedonian army, and proceeded to extend his sway beyond his own kingdom. The terror of his name provoked the *Philippics* of Demosthenes, who endeavored to rouse the people of Athens to form a general league of the Greeks against him; but by 346 he was master of the Phocian cities and of the pass of Thermopylæ, and as general to the Amphictyon council he was the crowned protector of the Grecian faith. In the spirit proper to his office he marched into Greece to punish the Locrians for an act of profanity; but instead he seized the city of Elatea, and began to fortify it. Demosthenes now exerted all his eloquence and statesmanship to rouse the ancient spirit of Grecian independence, and a powerful army was soon in the field, but being without able or patriotic commanders it was defeated at the decisive battle of Chæroneia

in August, 338 B.C. After this last struggle for freedom Philip was acknowledged chief of the whole Hellenic world, and at a congress held at Corinth he was appointed commander of the Greek forces, and was to organize an expedition against Persia. While preparing for this enterprise he was murdered.

Philip I (1052–1108), king of France, son of Henry I, succeeded to the throne under the guardianship of Baldwin V, count of Flanders, in 1060. The Norman conquest of England took place in his reign, and he supported Prince Robert, son of the Conqueror, in his revolt against his father. He was a worthless debauchee and was detested by his subjects.

Philip II (1165–1223), AUGUSTUS, king of France, was crowned as successor during the lifetime of his father Louis VII, whom he succeeded in 1180. One of his first measures was the banishment of the Jews from the kingdom, and the confiscation of their property. He invaded Normandy during Richard's captivity (1193), confiscated the possessions of King John in France after the death of Prince Arthur (1203), prepared to invade England at the instance of the pope (1213), turned his arms against Flanders and gained the celebrated battle of Bouvines (1214).

Philip III (1245–1285), called the *Hardy*, king of France, was the son of Louis IX and Margaret of Provence. He succeeded his father 1270. In 1271 he possessed himself of Toulouse on the death of his uncle Alphonso; in 1272 he repressed the revolt of Roger, count of Foix, and in 1276 sustained a war against Alphonso X, king of Castile. The invasion of Sicily by Peter of Aragon, and the massacre of the French, known as the "Sicilian vespers," caused him to make war against that prince, in the course of which he died.

Philip IV (1268–1314), king of France, succeeded his father in 1285. He had already married Joanna, queen of Navarre, by which alliance he added Champagne as well as Navarre to the royal domain, which he made it his policy still further to increase at the expense of the great vassals. He was long engaged in war with Flanders, which resulted in the accession of the Walloon territory to France, and the restoration of the rest of Flanders to its count on condition of feudal homage. Philip left numerous ordinances for the administration of the kingdom, which mark the decline of feudalism and the growth of the royal power. He also convoked and consulted the states general for the first time.

Philip VI (1293–1350), OF VALOIS, king of France. He succeeded to the crown in 1328. In his reign occurred the wars with Edward III of England, who claimed the French crown as grandson, by his mother, of Philip IV. His reign was unfortunate for France by the long war which it inaugurated, known in France as the Hundred Years' War; and he has left an evil memory by his persecutions of Jews and heretics, his confiscations, and exactions.

Philip II (1527–1598), of Spain, was the son of Charles V and Isabella of Portugal. He was married in succession to the Princess Mary of Portugal 1543, and to Mary of England in 1554, the same year in which he became king of Naples and Sicily by the abdication of his father. In 1555 his father resolved to abdicate the sovereignty of the Netherlands in Philip's favor; and in 1556 he received the crown of Spain, with its possessions in Asia, Africa, and America. His first act was to propose a truce with France, which was broken almost as soon as concluded. In 1556 he went to England, where he was refused the ceremony of a coronation and the troops that he demanded in aid of his war with France. These, however, were at length conceded to him by Mary. In 1559 the French War was concluded and the marriage of Philip to Elizabeth of France took place. In 1566 the revolt of the Netherlands commenced, which ended in the separation of the seven northern provinces from the crown of Spain, and their formation into the Dutch Republic. This struggle lasted about thirty years, till the close of Philip's reign. In 1571 the Archduchess Anne of Austria became his fourth wife. In 1580 his troops under Alva subdued Portugal, of which, and all its dependencies, Philip now became sovereign. In 1586 Philip declared war with England. The year 1588 saw the destruction of the Armada and the descent of Spain from her position as a first-class power in Europe. The remainder of his reign was occupied with war and intrigues with France, but in 1598 the Peace of Vervins was concluded. Philip showed some disposition at the same time to make peace with England and the Netherlands, but his offers were not accepted.

Philip V (1683–1746), of Spain, the first Spanish king of the Bourbon dynasty, was b. at Versailles. He succeeded to the crown of Spain by the will of Charles II, who d. without direct heirs. On the death of Charles in 1700, he was immediately proclaimed king, and was generally recognized in Spain, Naples, and the Netherlands; but the succession was contested by the Archduke Charles of Austria, whose claim was enforced by the armies of England, Holland, and Austria in the wars of the Spanish Succession, which began in 1702. By the Treaty of Utrecht (1713) he was recognized as king of Spain, but Gibraltar was lost to Spain, Minorca was also ceded to England, Sicily to Savoy, the Netherlands, Naples, and the Milanese to Austria. He married Elizabeth Farnese, niece of the Duke of Parma, in 1714, and Alberoni, the minister of the Duke of Parma in Spain, became prime minister. In 1724 Philip resigned the crown of Spain in favor of his son Don Louis, but the death of Louis a few months later induced him to resume the royal power. He d. after a reign of forty-six years.

Philip I (The Magnanimous) (1504–1567), landgrave of Hesse. He began to reign at the age of fourteen, and introduced the Lutheran religion into Hesse in 1526. In 1527 he founded the University of Marburg, subscribed the protestation to the Diet of Spires in 1529, submitted the confession of faith at Augsburg in 1530, and in 1531 formed with the Protest-

ant princes the Schmalkalden League. He was forced to submit to Charles V in 1547, who kept him a prisoner for five years.

Philippine Islands, a large group of islands in the northern part of the Malayan Archipelago. They lie northeast of Borneo and east of French Indo-China, and are bounded on the north and west by the China Sea, on the east by the Pacific Ocean, and on the south by the Sea of Celebes. There are in the group about 1,600 islands, most of which are very small. The largest is Mindanao, with an area of 45,559 square miles. Luzon, the most important of the group, has an area of 43,075 square miles. The only other islands of geographical importance are Samar, Negros, Panay, Palawan, Mindoro, Leyte, Cebu, Bohol and Masbate. The area of the total land surface is nearly 128,000 square miles.

Surface and Climate.—The surface is mainly rugged and hilly, showing volcanic origin. The coasts are deeply indented. Earthquakes are frequent and destructive. The soil is fertile and is covered with a luxuriant growth of tropical vegetation. The climate is tropical, characterized by heavy rainfall due to the position and elevation of the islands. Only two seasons are recognized, the wet season from June to October, and the dry season covering the rest of the year. From July to October terrible cyclones, known as typhoons, frequently occur, sometimes causing great loss of life and property. On the whole the climate is not unhealthful for the natives, but Europeans and Americans find difficulty in accustoming themselves to its peculiarities.

Population.—The native inhabitants, called Filipinos, are of two races—the Negrito and the Malay. The former are savages. They are small in stature, with closely curled hair, yellow skin and white teeth, which they file. The average height of a Negrito is about 58 inches. The Malays are taller, averaging 59 inches in height. Their bodies are meager but sturdily built and of a dark brown color. The remainder of the population consists mainly of Chinese, Japanese and mixed races. The number of Europeans is comparatively small, most of them residing in the city of Manila. The Filipinos have attained a form of civilization fairly comparable with, and in some respects in advance of, that on the continent adjacent. The native dress consists of an article of headgear combining the functions of hat and umbrella, and a rain-cloak varying in form and material in the different islands. The typical Philippine house is built with reference to its use during the rainy season. The structure of bamboo and palm leaves rests on four or more heavy timbers set into the ground so that the floor is raised five or ten feet above the surface, allowing the breeze to blow through and keep the ground dry. In the better class of houses, corrugated iron is used for roofing and big flat oyster shells for windows. According to the latest government estimate the total population is 6,975,073. The largest city is Manila, with a population of 221,000 (1903).

Government.—The executive power of the

Philippines is vested in a Governor, Vice-Governor and the Philippine Commission consisting of five Americans and three Filipinos. The present Governor is General Luke E. Wright. A legislative assembly has been provided for, consisting of two chambers, the Philippine Commission constituting the Upper House, while the Lower House is to consist of from fifty to one hundred popularly elected delegates, apportioned among the provinces on the basis of population, except that each province shall be entitled to one member. To be qualified to vote for delegates a person must have held office under the Spanish regime; or own property to the value of $250, or pay taxes amounting to $15 or over; or speak, read and write Spanish or English. The Legislature is to hold annual sessions; its delegates are chosen biennially. If at any session it refuses to vote the necessary supplies for the support of the Government, the Governor may appropriate for that purpose a sum equal to the amount last appropriated. Every two years the Legislature is to choose two resident commissioners to the United States. Congress reserves the power to annul all laws passed by the Philippine Legislature. To the Bureau of Insular Affairs, instituted by the U. S. War Department, are committed all matters pertaining to the civil government, subject to the jurisdiction of the War Department. The Philippine Commission is required to make annual reports to the Secretary of War, of all receipts and expenditures of the Philippine Government. Local government has been instituted in most of the towns, each being formed into a municipality with a President, Vice-President and Council chosen for two years by qualified electors.

The judicial system comprises a Supreme Court consisting of seven justices, four American and three Filipino; sixteen courts of First Instance, presided over by native judges, and municipal criminal courts under justices of the peace. The United States Supreme Court is given appellate jurisdiction over all judgments of the Philippine Supreme Court involving more than $25,000, and over all cases where the Constitution, the laws, or any right or title claimed under the authority of the United States are in question. The justices of the Insular Supreme Court, as well as the Governor, Vice-Governor and the members of the Philippine Commission, are appointed by the President of the United States, with the advice and consent of the Senate.

Industries.—Agriculture is the chief industry of the Philippines. The staple products, in order of their importance, are Manila hemp, tobacco, sugar, coffee and rice. Among other products are maize, wheat, indigo, cocoanuts, sesame, peanuts and many varieties of vegetables. The fruits, both wild and cultivated, are superior in quality and abundant in variety. The mango under cultivation is finer than in any other country. Some of the islands, as Masbate, have comparatively little tilled ground, and depend more largely on live-stock. Carabaos, horses and cattle are raised exten-

sively in Masbate, and swine and fowls abound in every native settlement. The methods of farming are, however, still comparatively primitive. The seven Government experiment stations in the Philippines are actively engaged in introducing modern farm machinery and improved methods of farming. The Government distributes seeds and is giving sp cial attention to the cultivation of forage plants and to improved methods of growing coffee and rice. Most of the vegetables of the United States, except white potatoes and melons, are being successfully grown in the Philippines.

The most important manufactures are tobacco products. The chief center of their manufacture is Manila. The natives show great artistic skill in weaving fabrics of pina fiber, Manila hemp, wool, cotton and silk, and in making mats, hats, bags and many other articles of bamboo, rattan and palm leaves. They are also skillful in metal work and woodcarving. The forests are rich in ebony and other hard woods used in this work.

The mineral resources are supposed to be extensive, though their extent is not yet known. Thus far the chief mineral product is a highly carbonized lignite, which makes a very good substitute for true coal. It is widely distributed over the archipelago, but is now chiefly mined in Cebu. Gold is found in many localities and has long been mined by the natives. At present the prospects of gold mining in Luzon are very favorable. Copper, iron, silver and lead have been discovered, but have not yet been mined to any extent.

Commerce and Finance.—The exports consist mainly of agricultural products, while the imports are chiefly manufactured articles. Trade relations with foreign countries have grown rapidly since peace was restored in the islands, as the following table shows:

	1900	1904*
Exports	$19,751,068	$29,045,778
Imports	20,601,436	31,129,192

*These figures are for eleven months of the fiscal year which ended June 30, 1904.

The foreign trade is chiefly with Great Britain, on account of its large purchases of Manila hemp and its great sales of cotton cloth. But since 1900, the trade between the Philippines and the United States has steadily increased. During the first eleven months of the fiscal year which ended June 30, 1904, the exports to the United States amounted to $11,545,211, and the imports from the United States amounted to $4,397,799. Manila hemp is the principal article exported to the United States, while the United States supplies more of the food stuffs used in the Philippines (except rice) than any other country. The central Government is supported chiefly by import and export duties. The coinage in use comprises the Mexican silver dollar, and silver peso and fractional currency coined at the Manila mint.

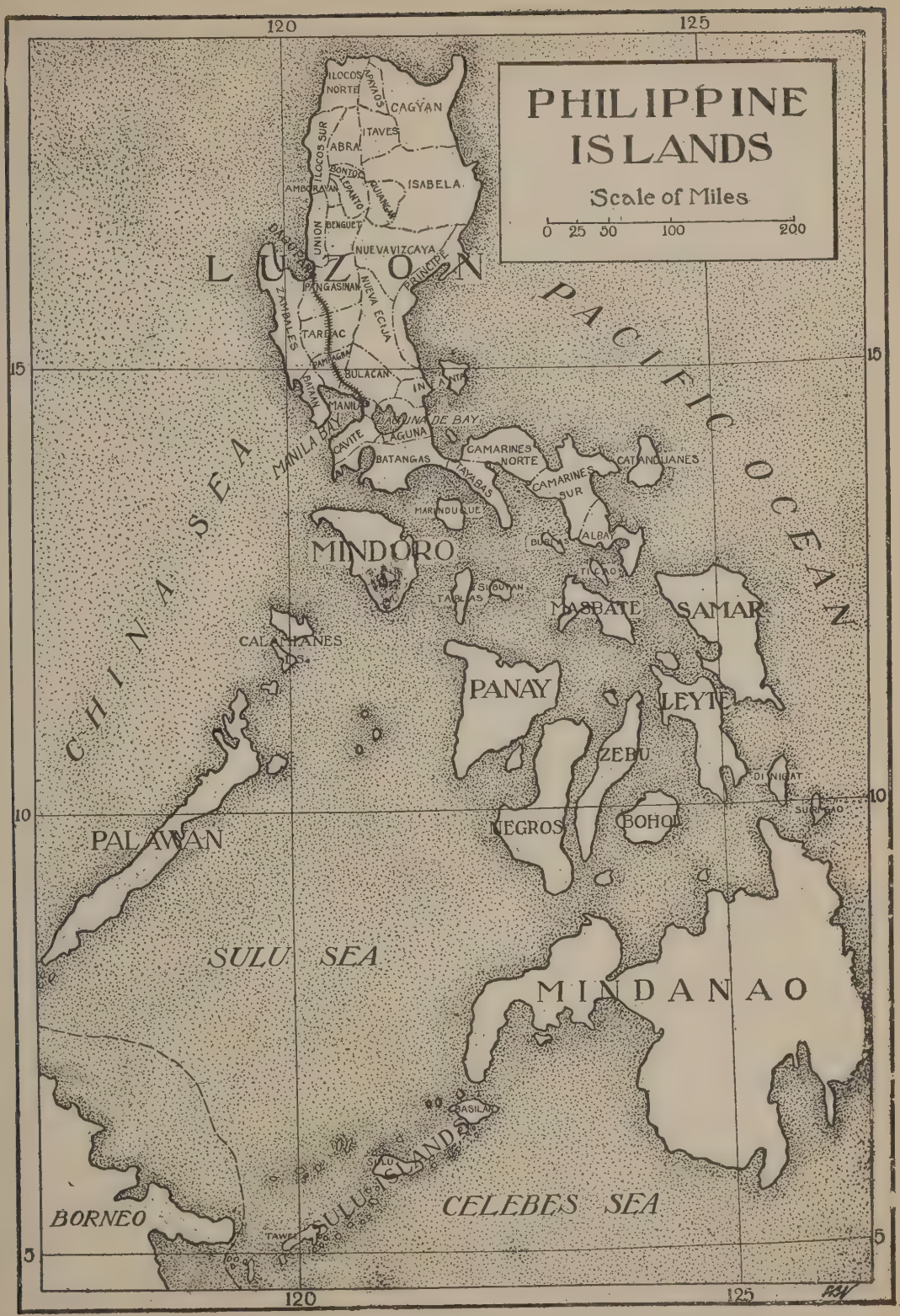
Philippine Islands

Communication.—As the Philippine Islands still lack railroads and have but few roads of any description, they are dependent upon the coasting trade for their domestic commerce. As large ships are compelled to anchor about two miles from the shore of Manila, the principal port, the foreign trade is also dependent on the small boats. The Government intends to dredge an inshore harbor and protect it by breakwaters so that the largest vessels may enter its docks. Commerce is much hampered by the poor inland communications and the lack of American merchant and passenger vessels between San Francisco and the Philippines. Telegraph lines connect most parts of the archipelago, and in 1903 electrical communication with the U. S. was opened up by means of the American Pacific Cable.

Education.—Before the arrival of the Americans in the Philippines, the public elementary school system required by Spanish law was widely diffused over the archipelago and higher education was well provided for. But the provisions for primary and secondary education were largely neglected, and the tendency was to center efforts upon the college and university. The school system devised and put in operation by the new administration is now thoroughly inaugurated and organized all over the islands. The archipelago is divided into seventeen educational divisions, with an American superintendent over each division. There are now in the islands over 1,300 American teachers who are coöperating with the native teachers, more than 3,000 in number, in the education of the masses. The chief aims of the common schools at present are the wide-spread dissemination of knowledge, especially in regard to the American language, institutions and ideals, and the practical agricultural and industrial training of the Filipinos. In these schools over 25,000 children and adults are learning to read, write and speak English. It has been necessary to establish night schools to accommodate the large numbers who apply for admission to the public schools. Permanent normal schools and vacation normal courses for the training of native teachers have been organized, and the establishment of technical schools, new schools of art and music, and a new university at Manila are contemplated.

Religion.—The civilized Filipinos are mainly Roman Catholics. The Moros living in the south and the wild tribes of the mountains are chiefly pagans. Hitherto, most of the parishes have been administered by Spanish friars, but the majority of them have now given up their parishes, and their places are being supplied by American priests as rapidly as is practicable. The work of the Church is now being ably directed by four American bishops, Archbishop Harty, and Bishops Rooker, Dougherty and Hendricks. Owing to the opposition to foreign clergy and the present scarcity of priests, the task which these fathers have before them is tremendous, but their piety, zeal and tactful policy have already accomplished much.

History.—The Philippine Islands were discovered in 1521 by Magellan. In 1542 a Spanish


PHILIPPINE ISLANDS
Scale of Miles
0 25 50 100 200
120
125
15
10
5
LUZON
PACIFIC OCEAN
CHINA SEA
MANILA BAY
LAGUNA DE BAY
ILOCOS NORTE
ILOCOS SUR
CAGAYAN
ISABELA
ABRA
BENGUET
NUEVA VIZCAYA
PANGASINAN
NUEVA ECIJA
TARLAC
ZAMBALES
BULACAN
MANILA
CAVITE
LAGUNA
BATANGAS
CAMARINES NORTE
CAMARINES SUR
CATANDUANES
MINDORO
MASBATE
SAMAR
CALAMIANES
PANAY
LEYTE
ZEBU
NEGROS
BOHOL
PALAWAN
SULU SEA
MINDANAO
BASILAN
SULU ISLANDS
BORNEO
CELEBES SEA

expedition was sent to the islands under Villalobos, who gave the group the name of *Islas Felipinas* in honor of Prince Philip, later King Philip of Spain. The permanent conquest of the islands was achieved by an expedition from Mexico under Legaspi. In 1570 Luzon was conquered and in June, 1571, the city of Manila was founded and became at once the seat of Spanish power in the islands. The dominating impulse in the extension of Spanish power over the Philippines had been religious rather than commercial. The aim of the Church was to make the islands an outpost of Christianity, from which the missionaries could prosecute effectively their labors in China and Japan. For over three centuries the Christian population steadily increased, and the people were happy in their obedience to the requirements of their faith. Schools and colleges were provided, the native languages were given literary form and translations made of devotional literature. The artistic instincts of the Filipinos were developed and some of the natives gained distinction in painting and literature. The petty governors and headmen were Filipinos, while the higher administrative officers were Spaniards. No Spaniards were allowed to live in the mission villages except the friars, who exercised there a firm but ordinarily gentle sway. The economic development of the islands was rendered impossible by the Spanish manufacturers, who secured the restriction of the imports from the Philippines to an annual shipload. During the course of time, by cession from the government, by legacy, by purchase, by occupation and by other means, the Spanish friars obtained possession of about 400,000 acres of the best agricultural lands in the Philippines. Some of these lands were worked directly under the supervision of the friars, but the greater part were leased to between 60,000 and 70,000 tenants. Gradually the happy relations between the friars and the Filipinos changed. In the islands and elsewhere opinions differ as to the cause of this change, and also as to the extent of the opposition to the friars. Some assert that they became obnoxious to a large part of the people, owing to the heavy contributions they are said to have levied for the support of the Church, and owing to their having acquired so much land, much of it by dispossessing the owners on the pretext of exacting the Church's dues. Others vigorously maintained that the unpopularity of the friars was only with a faction of the natives and sprang almost wholly from political motives, owing to the friars being the administrators of the Spanish government in the land, with a power almost absolute. However this may be, though the people in general remained good Catholics, loyal to the Church, there grew up among them a widespread distrust for, and hatred of the friars. This condition of things was the cause of many insurrections during the past century. In 1872, a learned Filipino priest named Joseph Burgos organized a movement to exclude the Spanish friars from parish duties, and demanding that native clergymen be given the care of souls.

Philippine Islands

The result was that Dr. Burgos and three other native priests who had joined him in the movement were executed on the Luneta and an outbreak of the natives followed. The last rebellion against the friars broke out in 1896, when Dr. Rizal, a favorite Filipino poet and physician, was executed by their influence. Dr. Rizal had incurred the hatred of the authorities by founding the *Liga Filipina*, to work for the expulsion of the friars and to secure political concessions for the islands. This insurrection centered in the province of Cavité and its leader was Emilio Aguinaldo (which see). In December, 1897, a treaty was made between Aguinaldo and Governor-General Primo de Rivera. According to its terms, important concessions were to be made to the natives and a certain sum of money paid to the leaders, who were to cease hostilities and leave the country. Peace was thus restored for a short time, but in March, 1898, the rebellion broke out afresh, and the Seventy-fourth Regiment of native soldiers in Spanish service deserted to the insurgents, who now outnumbered the Spanish forces. On the day that war began between the U. S. and Spain, Aguinaldo appeared in Singapore and in a conference with Dewey arranged to follow him to Manila, and act with him against Spain for the liberation of the Filipinos from her rule. On May 1, 1898, the Spanish fleet in the Bay of Manila was annihilated by the Asiatic squadron under Commodore Dewey. As he had not enough men to control the city of Manila at that time, no attack was made upon it, but the Government proceeded at once to fit out several army expeditions for the Philippines. Meanwhile Aguinaldo had arrived at Cavité and had an interview with Dewey, who supplied him with arms for the insurgents who flocked to his standard, thinking that the United States would pursue in the Philippines the policy proposed for Cuba. In the weeks that elapsed before the arrival of the American troops, the insurgent forces invested Manila from the northern and eastern sides. Late in July Gen. Merritt reached Manila with over 600 officers and 15,000 men. On the fifteenth of August, after a brief assault, and with but little loss of life, the capital surrendered unconditionally to the Americans. In a treaty signed December 10, 1898, Spain ceded the whole group of islands to the United States, and the United States agreed to pay Spain $20,000,000, give Spanish ships and merchandise admission to the islands on the same terms accorded to American ships and goods for a period of ten years, and to transport to Spain the Spanish soldiers captured at the surrender of Manila. This treaty was ratified by the Senate, Feb. 6, 1899.

Meanwhile Aguinaldo, anticipating the coming investment of Manila by the Americans, had organized a native government and in a provisional constitution promulgated June 23, 1899, announced the independence of the islands as the chief object of the revolutionary government. In July he addressed an appeal to the Powers for the recognition of Filipino independence, and in August was made presi-

GOVERNMENT HOUSE, MANILA

dent of the Filipinos. During the following months the Americans held Manila, and the forces of Aguinaldo the rest of the island. When President McKinley's proclamation that the islands had been ceded to the U. S., and that military rule would be established over them as soon as possible, reached the Philippines, relations became greatly strained between the insurgents and the American forces. Finally on Feb. 4, 1899, Aguinaldo assumed the defensive against the United States, beginning operations by an attack on Manila, in which he was, however, unsuccessful. Previous to this attack, a Commission had been appointed by President McKinley to investigate conditions in the islands, and to labor for the acceptance of American rule by the Filipinos. The Commission began its work in March, 1899. Its efforts were devoted particularly to conciliating prominent Filipinos, and to building up a party favorable to American rule. Meanwhile, fighting continued between the Americans and the forces of Aguinaldo. During the first nine months the Americans made but little headway, but in the fall and winter their progress was more rapid. Finally, the native troops were so hard pressed by the Americans that Aguinaldo, after repeatedly removing his capital, was compelled to flee to the mountains. Here the fighting was continued with varying success until March 23, 1901, when Aguinaldo was captured at Palawan, in the province of Isabella, Luzon, and brought to Manila, where on April 2, 1901, he formally took the oath of allegiance to the U. S. On July 4th, military government was superseded by civil government in the pacified districts, and by act of Congress, approved July 1, 1902, civil government was established throughout the islands. The Philippines are now quiet save for the existence of the *Ladrones*, or highway robbers, who live by plundering the property of the peaceful and industrious inhabitants. The Friar Land Question, mentioned above, seems now to be practically settled. Governor Taft, through negotiations with the Vatican and the representatives of the various orders, succeeded in buying these lands for about $7,000,000. It is the purpose of the Government to resell the friar lands in small holdings, giving preference to the present occupants, at a price that will nearly cover the cost of purchase. (See subhead *Religion*, above).

Philippine Languages.—There are numerous dialects spoken in the Philippine Islands. Those of the Malays form a closely connected group and apparently differ considerably from the Negrito dialects, though they are similar in sound. But little is known of the language of the Negritoes, who live in scattered tribes in the interior of most of the large islands. Among the languages of the Malay race, which constitutes the bulk of the population, several, such as the *Tagalog* of Manila and the coast of Mindoro, and the *Bisayan* of the Bisayan Islands and the North and East Mindanao, have reached a high state of development.

The vocabularies of the Philippine languages contain several foreign elements. Many of the dialects have borrowed a number of Sanskrit words, and the languages of the Christian tribes contain words of Spanish derivation, while Arabic words have crept into the Mohammedan dialects. The alphabets in which the native languages are written are also due to these foreign influences. The native alphabets, which are no longer used except by the Tagbanuas of Palawan and the Mangians of Mindoro, were probably derived from India. The sounds of the letters are in the main similar to those of the English language. The sounds peculiar to the Filipinos are the guttural-nasal *ng* and the phonetic modification of *d*, producing a characteristic *r*-sound. A prominent characteristic of the Filipino dialects is the use of particles to accomplish derivation. These particles are usually employed as prefixes, though there are also a few suffixes and infixes. There is no distinction of gender and practically no inflexion to denote person, number or case in verbs or nouns; in pronouns, however, there is a species of inflexion to indicate case. Other peculiar features of the language are the frequent use of the passive construction and the fewness of prepositions.

Phil-ip-pop'olis, a city of Bulgaria situated in a broad, fertile plain at the head of Maritza River, on the railroad between Constantinople and Sofia. It is 80 miles southeast of Sofia and ranks next to that city in size. In ancient times it was an important Thracian city. It was almost wholly destroyed by an earthquake in 1818 and was ravaged by fire in 1846, but owing to its excellent trade facilities recovered rapidly each time. The city is the chief commercial center of Southern Bulgaria, having an active trade in its manufactures of silk and cotton fabrics and attar of roses, as well as in rice, grain, tobacco and hides. Of recent years it has been much enlarged and beautified and is a favorite home of wealthy Greeks and Bulgarians. Pop. 1900, 42,849.

Philis'tines, the name of a Semitic people or race who inhabited the southern part of the lowlands of Palestine, from the coast near Joppa to the Egyptian desert south of Gaza. They occupied five chief cities (Ashdod, Gaza, Gath, Askelon, Ekron), and these formed a kind of confederacy under five lords or chiefs.

Phillips, Wendell (1811–1884), abolitionist, was b. at Boston, Mass., the son of the first mayor of the city (1822). He graduated at Harvard with Motley in 1831, studied law there, and was called to the bar in 1834. But before clients came he had been drawn away from his profession to the real work of his life. A timely and important speech in Faneuil Hall in 1837 made him at once the principal orator of the antislavery party; and henceforth, until the president's proclamation of Jan. 1, 1863, he was Garrison's loyal and valued ally, his lectures and addresses doing more for their cause than can well be estimated. He also championed the cause of temperance, and that of women, and advocated the rights of the Indians. In 1870 he was nominated for governor by the Prohibitionists and the labor

party. His speeches and letters were collected in 1863.

Phillipsburg, Warren co., N. J., on Delaware River. Railroads: New Jersey Central; Pennsylvania; D. L. & W.; and Lehigh Valley. Industries include extensive iron works, rolling mills, locomotive, boiler, and machine works, and a large mower and reaper manufactory. It is in a limestone, agricultural, and iron ore region. Pop. 1900, 10,052.

Philology (or comparative philology), a term commonly used as an equivalent to the science of language, otherwise called *Linguistic Science*, or *Linguistics*. This science treats of language as a whole, of its nature and origin, etc., and of the different languages of the world in their general features, attempting to classify and arrange them according to such general features, and to settle in what relationship each stands to the others. The philologist as such does not study languages for practical purposes, or to be able to read and speak a number of them, though the more he is tolerably familiar with the better. He rather studies them in the way a naturalist studies a series of animals or plants, as if they were separate organisms each with a life and growth of its own. That every language has such a life and growth is true in a sense, for languages are continually in a state of change; yet a language is not to be regarded as an organism like a plant or an animal, but rather, to quote Professor Whitney, as an *institution*, an outcome of the needs of human beings for communication with their fellows. A language is a system of vocal sounds through which ideas are conveyed from person to person in virtue of the fact that certain ideas are attached or belong to certain sounds by a sort of convention or general understanding existing among those who use the language. That there is any natural law by which one idea belongs to one vocal sound rather than to another can hardly be affirmed in view of the fact that if we select any one idea we shall find that each of the thousand languages of the world expresses this idea by a different sound or group of sounds. Indeed, ideas can be conveyed otherwise than by vocal sounds, as witness the elaborate sign language that has been developed in some communities, as also the finger language of the deaf and dumb. We can even conceive that a language of hieroglyphics or written symbols might exist with no spoken language alongside of it. We have, however, no knowledge of any such case, and, in fact, wherever man exists we find him making use of speech, which, indeed, is one of his most distinct and marked characteristics. As to the origin of language nothing is really known, although most probably it is an invention or acquisition of the human race, and not an original endowment. Any one, however, may believe if he pleases that man was created with a language and the faculty of making use of it already in his possession. If the other view is taken we must suppose that the earliest men had no language to start with, but that having suitable organs for speech they devised a language among themselves as a means of intercommunication, and we may conclude that the earliest attempts at speech were either in imitation of the different sounds heard in nature, or that they were based on the inarticulate utterances or cries by which human beings naturally gave vent to different emotions. But however language originally arose, it is very certain that whatever language we speak has to be acquired from others who have already learned to speak it, and that those others have similarly acquired it from their predecessors, and so on backward into the darkness of the remotest ages. Every language is thus at our birth a foreign language to all of us.

The science of philology is quite of modern origin, being hardly, if at all, older than the present century. Speculations on language and its nature were indulged in by the ancient Greeks; but as the Greeks knew little or nothing of any language but their own they had not sufficient materials wherewith to construct a science of language. In later times materials became more abundant as scholars studied Hebrew, Greek, Latin, Arabic, etc.; but it was the introduction of Sanskrit to the Western world, and its observed similarity in many respects to Greek that led to the establishment of philology on a true scientific basis, an achievement which was largely due to the labors of Bopp, Pott, Schleicher, and other German scholars. Yet though most valuable results have been attained and a large number of languages have been studied and classified, much remains to be done, much remains uncertain and must always remain so. One great difficulty that the philologist has to grapple with is the want of historical documents to throw light on the history of the great majority of languages, as only a very few possess a literature dating from before the Christian era, and far the greater number have no literature at all.

To begin with our own language and the kindred tongues. Philology has succeeded in showing that the English language is one of a group of closely allied languages which are known by the general name of the Teutonic or Germanic tongues. The other languages of the group, some of which are more closely connected with English than the rest, are Dutch, German, Danish, Icelandic or Old Norse, Swedish, and Gothic; to which may be added, as of less importance and having more the character of dialects, Norwegian, Frisian, the Plattdeutsch or Low German of Northern Germany, and Flemish, which differs little from Dutch. The Teutonic tongues are often divided into three sections, based on closeness of relationship: the *High German*, of which the modern classical German is the representative; the *Low German*, including English, Dutch, Frisian, Plattdeutsch, and Gothic; and the *Scandinavian*, including Danish, Swedish, and Icelandic. Another division is into *East Germanic*, including Gothic and Scandinavian; and *West Germanic*, including the others.

The evidence that all these languages are closely akin is to be found in the great number of words that they possess in common, in the similarity of their structure, their inflections, their manner of compounding words—in short, in their family likeness. This likeness can only be accounted for by supposing that these languages are all descended from one common language, the primitive Teutonic, which must have been spoken at a remote period by the ancestors of the present Teutonic peoples, there being then only one Teutonic people as well as one Teutonic tongue. In their earliest form, therefore, and when they began to be differentiated, these languages must have had the character of mere dialects, and it is only in so far as each has had a history and literature of its own that they have attained the rank of independent languages.

The rise of dialects is a well-known phenomenon, taking its origin in the perpetual change to which all languages are subject. A language that comes to be spoken over a considerable area and by a considerable number of persons—more especially when not yet to some extent fixed by writing and literature—is sure to develop dialects, and each of these may in course of time become unintelligible to the persons using the others, if the respective speakers have little intercourse with each other, being separated by mountain ranges, arms of the sea, or merely by distance. In this way is the existence of the different Teutonic tongues to be accounted for. A similar instance of several languages arising from one is seen in the case of Italian, French, Spanish, and Portuguese, all of which are descended from the Latin. Of the common origin of these we have, of course, direct and abundant evidence.

The Teutonic tongues, with the primitive or parent Teutonic from which they are descended, have been proved by the investigations of philologists to belong to a wider group or family of tongues, which has received the name of the Aryan, Indo-European, or (especially in Germany) Indo-Germanic family. The chief members of this family are the Teutonic, Slavonic (Polish, Russian, Bohemian), Lithuanian, Celtic (Welsh, Irish, Gaelic, etc.), Latin (or Italic), Greek (or Hellenic), Armenian, Persian, and Sanskrit. Just as the Teutonic tongues are believed to be the offspring of one parent Teutonic tongue, so this parent Teutonic and the other members of the Aryan family are all believed to be descended from one primitive language, the Aryan or Indo-European parent speech. The people who spoke this primeval Aryan language, the ancestors (linguistically at least) of the Aryan races of Europe and Asia, are believed by many to have had their seat in Central Asia to the eastward of the southern extremity of the Caspian Sea. This, however, is very problematical, and some philologists see reason to think that Europe may rather have been the original home of the Aryans. This latter view is now perhaps the one most generally held.

How remote the period may have been when the ancestors of the Teutons, the Celts, the Slavs, the Greeks, Romans, Persians, and Hindus were living together and speaking a common language is uncertain. Yet the general character of their language is approximately known, and philologists tell us with some confidence what consonant and what vowel sounds the Aryan parent speech must have possessed, what were the forms of its inflections, and what, at the least, must have been the extent of its vocabulary, judging from the words that can still be traced as forming a common possession of the sister tongues of the family.

In order to understand how it is that many words in the different Aryan tongues are really of the same origin, though superficially they may appear very different, it is necessary to know something of *Grimm's Law*. This law, which, like a natural law, is simply a statement of observed facts, is so named from the great German philologist who first definitely laid it down as the result of observation and comparison of the relative linguistic phenomena. It concerns the so-called "mute" consonants (*t, d, th; k, g, h* (*ch*); *p, b, f*) and takes effect more especially when these are initial. According to it, in words and roots that form a common possession of the Aryan tongues, being inherited by them from the parent speech, where in English (more especially Anglo-Saxon) and in most of the Teutonic tongues we find *t, d,* or *th;* we find in Latin, Greek, and Sanskrit not these letters, but respectively *d* instead of *t,* an aspirated sound instead of *d,* and *t* instead of *th.* That is, an English *t* corresponds to a Latin, Greek, and Sanskrit *d,* as is seen in *tame;* compared with L. *domare,* Gr. *damaein,* Skr. *dam,* to tame; an English *d* corresponds to Latin *f,* Greek *th,* Sanskrit *dh,* as in E. *door,* L. *fores,* Gr. *thyra,* Skr. *dvāra* (for original *dhvāra*), a door; an English *th* corresponds to Latin, Greek, and Sanskrit *t,* as in *thin,* compared with L. *tenuis,* Gr. *tanaos,* Skr. *tanu,* from root *tan,* to stretch. If we next take the gutturals we find that English *k* (or *c* hard), *g, h,* correspond respectively in the above languages to *g, h* (*ch, gh*), *k,* as is seen in E. *kin,* L. *genus,* Gr. *genos,* Skr. *janas* (where *j* is for original *g*); E. *goose* (modified from original *gans*), compared with L. *anser* (for older *hanser*), Gr. *chēn,* Skr. *hansa;* E. *head* (A. Sax. *heafod*), L. *caput,* Gr. *kephalē,* Skr. *kapāla.* Similarly *b* in English corresponds to *f* in Latin, *ph* in Greek, and *bh* in Sanskrit, as in *brother*=L. *frater,* Gr. *phratēr,* Skr. *bhratri,* a brother; *f* in English to *p* in Latin, Greek, and Sanskrit, as in *father*=L. *pater,* Gr. *patēr,* Skr. *pitri,* father. German exhibits certain letter-changes peculiar to itself, and for this reason is placed, in any full statement of Grimm's law, apart from the other Teutonic tongues. In German, for instance, *t* takes the place of an English *d,* as in G. *tag,* E. *day,* G. *teil,* E. *deal;* *d* the place of *th,* as in G. *ding,* E. *thing,* G. *drei,* E. *three,* etc. In some cases the law does not operate in consequence of the influence of other letters; thus the *s* of *stand* prevents the *t*

from becoming *th*, as it ought to do to represent the *t* of L. *stare*, to stand. Certain other exceptions to the law are accounted for by a subsidiary law of more recent discovery than Grimm's law, known as the *Verner's Law*, and formulating certain facts connected with the original accentuation of Aryan words.

The Aryan tongues, ancient and modern, are entitled to claim the first rank among the languages of the globe, both for richness, harmony, and variety, and more especially as embodying a series of literature to which no other family of tongues can show a parallel. Next in importance come the Semitic tongues — Hebrew, Chaldee, Syriac, Arabic, etc. These, like the Aryan tongues, form a well-marked family, one notable peculiarity of which is the possession of "triliteral" roots, or roots of which three consonants form the basis and give the general meaning, while inflection or modification of meaning is indicated by internal vowel-change. Thus the vowels play a subordinate part to the consonants, and do not, as in the Aryan tongues, associate with them on equal terms. Other important linguistic families are *Hamitic*, which includes the ancient Egyptian, the Coptic, Berber, Galla, Somali, etc.; the *Turanian* or *Ural-Altaic*, which includes Turkish, Finnish, Hungarian, Mongolian, etc.; and the *South-Eastern Asiatic*, which includes Chinese, Siamese, etc. The Turanian languages belong to the type known as *agglutinate* or *agglutinating*, being so called from the fact that the root always maintains a sort of independence or distinctive existence, the other elements of the word being more or less loosely "glued" or stuck on as it were. The Chinese is the chief of the *monosyllabic* languages, so called from their words consisting normally of monosyllables. Other families of languages are the Malayo-Polynesian of the Indian Archipelago and Pacific; the Bântu, a great family of South Africa; and the American Indian languages, which are characterized as *polysynthetic*, from the way in which they crowd as many ideas as possible into one unwieldy expression. All these families form groups, so far as is known, separate from and independent of each other; and attempts to connect any two of them, as Aryan and Semitic for instance, have met with little success. Formerly etymologists had no hesitation in deriving English words from Hebrew roots, but this was in the days when there was no science of comparative philology. That all languages are descendants of one original tongue, as is believed by many, linguistic science can neither affirm nor deny. We may add that community of language is not a proof of community of race, since it is well known that, as the result of war or otherwise, races have given up the language that once belonged to them and adopted some other.

Philome'la, in Greek mythology, a daughter of Pandion, king of Athens, who being violated and deprived of her tongue by Tereus, the husband of her sister Progne, made known her wrongs to the latter by embroidering it in tapestry. In revenge the sisters murdered Itys, the son of Progne by Tereus, and served him up to his father. Tereus pursued them, but they were changed by the gods into birds, Philomela and Progne into a nightingale and a swallow, and Tereus into a lapwing.

Philopœ'men (252–183 B.C.), an ancient Greek patriot and commander, b. at Megalopolis, in Arcadia. Having distinguished himself in war against the Spartans, he was, in 208 B.C., appointed commander in chief of the forces of the Achæan League. He defeated and slew with his own hand Machanidas, tyrant of Sparta, and subsequently defeated Nabis, the successor of Machanidas. Philopœmen, as commander of the Achæans, declared war against Sparta, and, having taken the city, treated it with the greatest severity. Messene now revolted, and Philopœmen, though broken by infirmity and disease, drove back the insurgents, but was afterward taken prisoner, carried in chains to Messene, and compelled to drink poison.

Philosophy, a term first brought into general use by Socrates. Philosophy is the science that deals with the general principles which form the basis of the other sciences, and of which they themselves take no cognizance. It follows up the data of experience to their ultimate grounds, regarding each particular fact in relation only to a final principle, and as a determinate link in the system of knowledge. In this view philosophy may be defined as the science of principles.

For all practical purposes the history of philosophy may be treated as commencing with the Greeks, the philosophic notions of the inhabitants of the East being considered merely as introductory to the Greek philosophy, in which many Oriental notions were incorporated. The first problem of Greek philosophy was to explain the enigma of external nature, to solve the problem not of the soul but of the world. Thales (about 600 B.C.) stands at the head of the Ionian school, which, with the Eleatic school, was the chief representative of speculative thought in pre-Socratic times; the former of these schools being characterized by Aristotle as seeking to find a material, the latter a formal principle of all things. The material principle sought by the Ionian school was assumed to be water by Thales, a primitive, infinite, but undetermined matter, by Anaxamander, and air, by Anaximenes. The Pythagoreans, abstracting from the quantative rather than the qualitative character of matter, substituted a symbolic principle—number—for the sensuous principle; but the Eleatics, transcending alike the sensuous principle of the Ionics and the quantative principle of the Pythagoreans, conceived of pure being as the one sole substance, the phenomenal world being viewed as unreal. The three great philosophers of this school are its founder Xenophanes, Parmenides, and Zeno. The transition from abstract to concrete being, from the Eleatic principle of unity to the world of phenomena, was attempted by Heraclitus (about 520 B.C.), who asserted for an absolute principle the unity of being and non-

being—becoming. According to him all things are in constant flux, the product of conflicting opposites, of the One at once warring and harmonizing with itself. Empedocles (440 B.C), in attempting to solve the reason of this flux, advanced the theory that matter was the principle of permanent being, while force was the principle of movement. The two moving forces in his system were love and hate. According to the Atomists, on the other hand, who are represented by Leucippus and Democritus (450 B.C.), the moving forces became an unintelligible necessity giving form to the world. Anaxagoras (b. about 500) asserted reason as the principle, and though he did not develop his theory to any extent, the mere expression of a spiritual principle is sufficient to mark it as forming an era in philosophy. In the hands of the Sophists this principle, in the sense of individual reason, became the occasion of their denial of all objective reality. In Socrates (470–399 B.C.), who united scientific method and a high ethical and religious spirit, the destructive teaching of the Sophists found its keenest opponent. What are called the minor Socratic schools—the Cynics, Cyrenaics, and Megarians—severally professed to regard Socrates as their founder, the Cynics, however, defining the end of action as self-sufficiency, the Cyrenaics as pleasure, and the Megarians as reason. With Plato (430–347) philosophy lost its one-sided character. Though professedly a disciple of Socrates his system of idealism is his own. The Platonic idea is the pure archetypal essence, which is the source of all the finite realities that correspond to it. The visible world is an inferior reproduction of the world of pure ideas, where shine in all their splendor the good, the true, and the beautiful. In logic Plato brings back science to general ideas. In ethics the highest end of man is regarded as the unity of his nature. Plato's ideal theory is criticised by Aristotle, because he gives no real explanation of the connection between the phenomenal and the ideal. In Aristotle's own system, instead of beginning with the general and the absolute, as Plato had done, he begins with the particular and individual. His whole philosophy is a description of the given and empirical; and his method is induction. His system presents us with a number of co-ordinate sciences, each having its independent foundation, but no highest science which should comprehend them all. The three schools of Greek philosophy which followed the systems of Plato and Aristotle, and which mark the declining days of Greece, are those of the Stoics, Epicureans, and Skeptics. Rome had no philosophy properly its own; the universal character of Roman philosophizing was eclecticism, of which Cicero was the most illustrious representative. In Alexandria Eastern and Western philosophy, as also Judaism, Christianity, and Paganism, came into contact. Neo-Platonism, founded by Ammonius Saccas (A.D. 193), strove to combine, in opposition to Christianity, the chief elements of classical and Eastern speculation. Hellenic ideas were mingled with a vague

symbolism, and with theories of ecstasy and divine union. Christianity, in the apologists of the second century and the Alexandrine fathers, related itself very early to the philosophy of the time, but not until about the eleventh century did there begin to manifest itself a distinctive Christian philosophy in scholasticism, which, assuming the dogmas of the church to be absolutely true, sought to justify them to the reason.

Modern philosophy, which begins with the fifteenth century, is characterized by a freer, more independent spirit of inquiry. First the scholastic philosophy was attacked by those who called to mind the ancient Greek philosophy in its original purity. After this struggle new views were presented. Bacon and Locke on the one hand, and Descartes on the other, stand respectively at the head of the two systems, empiricism and idealism, which begin modern philosophy. Bacon created no definite system of philosophy, but gave a new direction to thought, the empiricism which he founded finally developing into skepticism. The system of Descartes was opposed by Gassendi, and received modifications at the hands of others, especially Malebranche. The most important successor, however, of Descartes was Spinoza, who reduced the three Cartesian substances to unity, to one infinite original substance, the ground of all things, that excludes from itself all negation or determination, and is named God or nature. Locke (1632–1704), who had a precursor in Hobbes (1588–1679), the influence of whom, however, chiefly concerned the history of political science, is regarded as the father of modern materialism and empiricism. As occupying the general position of Locke mention may be made of Isaac Newton, Samuel Clarke, William Wollaston, the Earl of Shaftesbury, and Francis Hutcheson. The philosophy of Locke received a further development in France, where Condillac sought to explain the development of humanity by the simple development of the sensations. Then followed the materialism of Helvetius, d'Holbach, La Mettrie, and others, including several of the encyclopedists. In opposition to this materialistic tendency arose the idealism of Leibnitz and Berkeley. The theories of Leibnitz were systematized by Wolff, and from his time to Kant German philosophy assumed no new standpoint. Berkeley (1684–1753), founding on Locke's principle that we are percipient of nothing but our own perceptions and ideas, argued that the existence of bodies out of a mind perceiving them is impossible, and a contradiction in terms. Granting the premises of Berkeley, his conclusions could not be refuted; but it was reserved for Hume to trace out the ultimate consequences of the Cartesian and Lockian philosophy, and thus, though unintentionally, by a sort of *reductio ad absurdum*, to produce the great metaphysical revolution of which Reid and Kant were the first movers. The Scottish or "common sense" school of philosophy, with Reid (1710–96) at its head, has the merit of having first strongly incul-

cated the necessity of admitting certain principles independent of experience, as the indispensable conditions of thought itself. Reid therefore directed his inquiries to an analysis of the various powers and principles of our constitution, in order to discover the fundamental laws of belief which form the groundwork of human knowledge. Dugald Stewart, with some deviations, followed in the track of his master; but Thomas Brown departed on many points of fundamental importance from Reid's philosophy. The same occasion that gave rise to the Scottish school also produced the philosophy of Emmanuel Kant. Kant (1724–1804), who may be justly regarded as the father of the philosophy of the nineteenth century, sought to bring together into unity the one-sided endeavors of his predecessors in the realistic and idealistic schools. He took up a critical standpoint, and from it instituted an inquiry into the origin of our experience or cognition. The ablest opponent of the Kantian philosophy, Jacobi, took the standpoint of faith in opposition to that of criticism, in order to give theoretic certainty to the postulates of the practical reason.

In the hands of Fichte the critical idealism of Kant becomes absolutely subjective idealism. "All that is, is ego;" this is the principle of the Fichtian system; the world is merely phenomenal, consciousness is a phenomenon, perception is a dream. Fichte's subjective idealism found its continuation in the objective idealism of Schelling and the absolute idealism of Hegel. Schelling (1775–1854) started from the ego of Fichte, and by a combination of the doctrine of the ego with Spinozaism transformed it into the system of identity. Object and subject, real and ideal, nature and spirit, are identical in the absolute, and this identity we perceive by intellectual intuition. Schelling subsequently, by successively incorporating into his system various opinions from Bruno, Böhme, and others, developed a syncretistic doctrine which constantly approximated to mysticism. Hegel (1770–1831), developing this principle of identity, created the system of absolute idealism. In his philosophy he aims at elevating consciousness to the standpoint of absolute knowledge, and systematically developing the entire contents of this knowledge by means of the dialectical method. Schleirmacher (1768–1834) promulgated an eclecticism to which Plato, Spinoza, Kant, and Schelling were the chief contributors. Schopenhauer (1788–1860) developed a doctrine which may be described as a transitional form from the idealism of Kant to the realism at present prevalent. In opposition to Fichte's subjective idealism, and to Schelling's renewed Spinozaism Herbart (1776–1841) developed a philosophic scheme on the basis of the realistic element in the Kantian philosophy, as also of Eleatic, Platonic, and Leibnitzian doctrines. After the death of Hegel, Feuerbach, Richter, Strauss, Arnold Ruge, and others developed, in an extreme manner, Hegelian thought, and recently Hegelianism has counted more adherents than any other system. Next to it has stood the Herbartian school; and more recently the modification of systems through a return to Aristotle or Kant, and the study of philosophy upon its historic side, have occupied the larger number of minds. While resting in part upon the basis of the doctrines of earlier thinkers, Trendelenburg, Lotze, and others have advanced in new and peculiar paths. In France two philosophical tendencies opposed the sensualism and materialism so universal at the beginning of the century. Of these the one was theosophical and the other found expression in the eclectic and spiritualistic school founded by Royer-Collard as the disciple of Reid, and further built up by Cousin, who incorporated into its body of doctrines a number of German philosophical notions. Jouffroy attempted to unite the philosophy of his predecessor Maine de Biran to that of the Scottish school, and became associated with the spiritualistic school, to which also belong the names of Garnier, Janet, Rémusat, Franck, Jules Simon, and others. This school has contended valiantly against the pantheistic tendencies of the age. Independent systems are those of Pierre Leroux, Lamennais, Jean Reynaud, and Buchez. Materialism has its supporters in Cabanis, who sees in thought only a secretion of the brain, Broussais, Gall, and others. Positivism, founded by Auguste Comte, numbers not a few followers.

In Great Britain the Scottish school had later exponents in Sir James Mackintosh (1765–1832) and Sir William Hamilton (1788–1856), the last named largely influenced in some points of his psychology by Kant. Mansel may be mentioned as a disciple of Hamilton. Ferrier (1808–64) assumed a polemical attitude toward the common-sense school in respect of its fundamental peculiarity, as he viewed it, of absorbing philosophy into psychology, as well as on minor details of the system. The associational psychology of Hartley, Priestly, and Dr. Darwin found representatives in the nineteenth century in James Mill (1773–1836) and his son John Stuart Mill (1806–73), who make the principle of association the sole explanation of psychical phenomena. Bain, Grote, and Lewes followed more or less in the same track. Herbert Spencer attempted to widen the psychological principles of the associational psychology into a universal doctrine of evolution. Among the chief leaders of philosophic thought opposed to the English school of empiricism may be mentioned the names of the late T. H. Green, Hutchison Stirling, and Edward Caird. In America, as in England, philosophy has been prosecuted more as an applied science, and in its special relations to morals, politics, and theology. Speculation here has been widely influenced by Scottish philosophy. Among the best known names of American philosophical writers are those of Jonathan Edwards, Henry P. Tappan, Thomas C. Upham, Francis Wayland, and others. A modified scholasticism, mostly Thomism, prevails in the Catholic seminaries of France, Spain, and Italy. In most of the continental countries German philosophy has exerted no

small influence. In Italy a peculiar philosophical school, represented by Rosmini, Mamiani, and Gioberti, has flourished during the present century.

Philos'tratus, Flavius, a Greek writer, b. at Lemnos about the middle of the second century. He taught rhetoric at Athens and subsequently at Rome, where he obtained the favor of the emperor Septimius Severus, and he accompanied the empress Julia Domna in her travels. His principal work is his *Life of Apolonius of Tyana*, supposed by some critics to be a parody on the Gospels. His other works are the *Heroica*, a history in dialogue of the heroes of the Trojan War, *Lives of the Sophists*, *Letters*, etc.

Phlebot'omy (Greek, *phleps*, *phlebos*, a vein, and *temnein*, to cut) (or venesection), the act of letting blood by opening a vein; a method of treatment formerly applied to almost all diseases, but now chiefly confined to cases of general or local plethora. Another mode of letting blood is by cupping or by the application of leeches. It has been one of the processes of the medical profession from the earliest times.

Phleg'ethon, in the Grecian mythology, a river of fire in the infernal regions.

Phlox, a genus of perennial herbaceous plants, natives for the most part of North America, though some of the species are to be met with in Asia. The flowers, which are favorites in gardens, are of a purple or violet color, more rarely white or red, with a salver-shaped corolla, and a narrow sub-cylindrical tube longer than the calyx. The trailing kinds are excellent for rock work.

Phlox.

Pho'cion, an Athenian general, and one of the most virtuous characters of antiquity; supposed to have been b. about B. C. 402. In the war with Philip of Macedon the Athenians sent Phocion with some troops to Eubœa, where he obtained a complete victory over the enemy. Some time after, he was dispatched to assist the cities of the Hellespont against Philip, whom he compelled to retire. According to Plutarch he was nominated commander forty-five times without once applying for the office. He always led a simple life, and cultivated his small farm with his own hands.

Phœnicia, in ancient geography, a country on the coast of Syria, bounded on the e. by Mount Lebanon, and containing the celebrated cities Tyre and Sidon. Phœnicia proper was a tract of country stretching along the eastern shore of the Mediterranean, not much more than 28 mi. in length, and little more than 1 mi. in average breadth; Sidon being situated near its northern, and Tyre not far from its southern boundary. In a wider sense Phœnicia was regarded as beginning on the north with the Island of Aradus, and extending south to the town of Dora, a little below the promontory of Carmel, being about 120 mi. in length, and rarely more than 20 in breadth. It is watered by several streams flowing from Lebanon to the sea, such as the Eleutherus, the Adonis, the Lycus, the Tamyras, the Leontes. The country is fertile in timber, corn, fruits, etc.; and besides the great cities of Sidon and Tyre, it was anciently studded with numerous smaller towns, forming almost an unbroken line along the coast. Among these towns in earlier times were Arvad, Accho, Arka, Tripolis, Berytus, Sarepta, Dora, etc. Many of the roadsteads or harbors were excellent, but are now silted up.

The question as to the original seat of the Phœnicians has received no satisfactory solution; but that, like the Jews, they were Semites by race, is well known. Their immigration to the coast of the Mediterranean belongs to prehistoric times. The settlement of Israel in Canaan did not produce any great or permanent change on Phœnicia. The tribes of Naphtali, Asher, and Dan, to which it was assigned, did not conquer Phœnicia, but occupied only a small portion of it; and the subsequent relations of Israel and Phœnicia were for the most part those of amity, intercourse, and reciprocal advantage. The wealth and power of the Phœnicians arose from their command of the sea, and it was their policy not to provoke any of the nations to the east of them, and not to quarrel unnecessarily with Israel, which was their granary. The relation between Hiram and David was probably but a sample of such international treaties and intercourse. After the division of the Hebrew kingdom Phœnicia would naturally cultivate alliance with the Ten Tribes nearest to it, and Ahab married a Phœnician princess. The country was afterward successively incorporated in the Assyrian, Babylonia, and Persian empires, but the cities retained more or less their independence. It was next conquered by Alexander the Great, and henceforth simply formed part of Syria.

From a very early period the Phœnicians occupied themselves in distant voyages, and they must speedily have reached to a style of substantial shipbuilding. Xenophon passes a high eulogy on a Phœnician ship; they were skilled in navigation and the nautical applications of astronomy. Lebanon supplied them with abundance of timber, and Cyprus gave them all necessary naval equipments, from the keel to the top sails. In the region of Pharaoh-Necho these daring navigators even circumnavigated Africa, and the Phœnicians furnished Xerxes with three hundred ships, which took part in the battle of Salamis. The commerce of Tyre reached through the world. It traded in the produce of the whole known world, from the ivory and "bright iron" and

ebony and cotton fabrics of India to the tin from Cornwall and Devonshire. Fishing was also an important industry, and the Tyrians sold fish in Jerusalem. The Phœnicians excelled in the manufacture of the purple dye from the shellfish *murex*, abundant on its coasts. The glass of Sidon was no less famous than the Tyrian dye. Phœnicia produced also articles of silver and gold as well as of brass; its inhabitants were also skilled in architecture and mining.

The maritime knowledge and experience of Phœnicia led to the planting of numerous colonies in Cyprus, Rhodes, and the islands of the Ægean—the Cyclades and Sporaces—in Sicily, in Sardinia, the Balearic Islands, and in Spain. The most celebrated of the Phœnician colonies, however, was Carthage, in Northern Africa, which extended its sway over the Spanish peninsula and disputed with Rome the supremacy of the Mediterranean.

As was the case in Canaan at the invasion, each Phœnician city was governed by a king or petty chief. A powerful aristocracy existed in the chief towns, and there were also elective magistrates, called by the Romans *suffétes*, a disguised form of the Hebrew *soffet*. Sidon, and afterward Tyre, exercised a hegemony over the other states. The relation of Phœnicia to her colonies does not seem to have been very close. Their religion, however, bound the mother country and the colonies in a common worship. Carthage often sent presents to the chief Phœnician god; so did Gades and other settlements.

The religion of the Phœnicians was a species of nature worship, the objects of adoration being the sun, moon, and five planets; or in another form it was the worship of male and female reproductive powers—the former represented as Baal and the latter as Baalith, Ashtoreth, or Astarte. The god called Il, a sort of Phœnician Chronos or Saturn, resembling the Moloch or Milcom of the Ammonites, had human sacrifices offered to him. Marine deities must have held a prominent place in their theogony—deities corresponding to the Greek Nereus and Poseidon, which last was worshiped at Berytus. In the oldest temples there were no images, but there were rude fetishes, conical or oblong stones, possibly aerolites "fallen from heaven," and fossil belemnites. While the wealth and commerce of Phœnicia must have brought art and refinement, the people were noted for their dissoluteness. As a people the Phœnicians early obtained a reputation for cunning and faithlessness. They were often pirates; they were certainly slave-traders. They purchased slaves from the northern shores of the Black Sea, and they also kidnapped and sold the children of Israel—a practise which brought upon them the denunciation of the prophets, and a just retaliation was predicted to fall upon them.

The language of ancient Phœnicia was closely akin to Hebrew. The famous passage in the Pœnulus of Plautus illustrates the assertion. Of ninety-four words on a tablet discovered at Marseilles in 1845 relating to the sacrificial ritual, no less than seventy-four are found in the Old Testament. Coins and seals also disclose the same affinity as do the numerous inscriptions. Proper names can all be explained in the same way. The invention of letters is often ascribed to the Phœnicians. The Greeks believed that letters had been brought to them from Phœnicia by Cadmus. The literature of Phœnicia has perished.

Phœnix, a fabulous Egyptian bird, about the size of an eagle, with plumage partly red and partly golden. Of the various stories told of it by Herodotus and others the most popular is to the effect that the bird, at an age of 500 years, conscious of its approaching death, built a funeral pile of wood and aromatic gums, which it lighted with the fanning of its wings, and rose from the flames with a new life. The Egyptians regarded it as a symbol of immortality, and it is still used as an emblem of this.

Phœnixville, Chester co., Pa., on the Schuylkill River, 28 mi. n. w. of Philadelphia. Railroads: Pennsylvania, and the Philadelphia & Reading. Industries: extensive iron works producing iron bridges, nails, architectural iron, etc., also planing mills, silk, shirt, and stocking manufactories, and needle works. Pop. 1900, 9,196.

Pho'nograph, an instrument by means of which sounds can be permanently registered, and afterward reproduced from the register. It consists essentially of a curved tube, one end of which is fitted with a mouthpiece, while the other end (about 2 in. in diameter) is closed in with a disk or diaphragm of exceedingly thin metal. Connected with the center of this diaphragm is a steel point, which, when the sounds are projected on the disk from the mouthpiece, vibrates backward and forward. This part of the apparatus is adjusted to a cylinder which rotates on a horizontal axis. On the surface of the cylinder is cut a spiral groove, and on the axis there is a spiral screw of the same pitch, which works in a nut. When the instrument is to be used a piece of tin foil is gummed round the cylinder, and the steel point is adjusted so as to be just touching the tin foil, and above the line of the spiral groove. If some words are now spoken through the mouthpiece, and the cylinder kept rotating either by the hand or clockwork, a series of small indentations are made on the foil by the vibratory movement of the steel point, and these markings have all an individual character of their own, due to the various sounds addressed to the mouthpiece. The sounds thus registered are reproduced by approaching the diaphragm and its steel point toward the tin foil as at first commencing, at the point where it was when the cylinder originally started, and then once more setting the cylinder in motion. The indentations previously made now cause the steel point to rise or fall or otherwise move as the markings pass under it, and the result is that the diaphragm is thrown into a state of vibration exactly corresponding to the movements induced by the markings, and thus affects the air around so as to produce sounds, and these vibrations being ex-

actly similar to those originally made by the voice, necessarily reproduce the sounds to the ear as the words at first spoken. These marked strips of foil may be posted to any person with whom the speaker wishes to correspond, and who must, of course, have a machine similar to that of the sender. The contents of the strips may be reproduced at any length of time, and repeated until the markings become effaced.

Phosphate, in chemistry, the generic term for the salts formed by the union of phosphoric anhydride with bases or water or both. They play a leading part in the chemistry of animal and plant life, the most important in this connection being the phosphate of soda, phosphate of lime, and the basic phosphate of magnesia. In agriculture the adequate supply of phosphates to plants in the form of manures becomes a matter of necessity in all deplenished soils. These phosphatic manures consist for the most part of bones, ground bones, mineral phosphates, basic slag, superphosphates and reduced superphosphates, bone-ash and phosphatic guano.

Phosphores′cence, the property which certain bodies possess of becoming luminous without undergoing obvious combustion. It is sometimes a chemical, sometimes a physical action. Certain mineral substances exhibit the phenomenon when submitted to insolation, to heat, to friction, to electricity, or to cleavage. Rain, water spouts, and meteoric dust sometimes present a self-luminous appearance. Several vegetable organisms, chiefly cryptogams, exhibit this kind of luminosity; but the most interesting cases of phosphorescence occur in the animal world, the species in which the luminous property has been observed belonging nearly to every main group of the zoological series. In some of the lowest life forms and in many of the jelly fishes the whole surface of the body is phosphorescent; in other organisms the phosphorescent property is localized in certain organs, as in the sea-pens, certain annelids, the glow worms, fire flies, etc.; while many deep sea fishes have shining bodies embedded in the skin. The phosphorescence of the sea is produced by the scintillating or phosphorescent light emitted from the bodies of certain microscopic marine animals, and is well seen on the surface of the ocean at night. Phosphorescence in animals appears to be a vital process, consisting essentially in the conversion of nervous force (vital energy) into light; just as the same force can be converted by certain fishes into electricity.

Phospho′ric Acid, an acid usually obtained by burning phosphoretted hydrogen in atmospheric air or oxygen. It is also produced by the oxidation of phosphorous acid, by oxidizing phosphorus with nitric acid, by the decomposition of apatite and other native phosphates, and in various other ways. It is used in medicine in the form of solution, constituting the dilute acid of the Pharmacopœia. It is peculiarly suited to disordered states of the mucous surfaces, and also to states of debility, characterized by softening of the bones.

Phos′phorus, a solid non-metallic combustible substance ranking as one of the elements. It occurs chiefly in combination with oxygen, calcium, and magnesium, in volcanic and other rocks, whose disintegration constitutes very fertile soils. It exists also in the plants used by man as food, and is a never-failing and important constituent in animal structures. It is manufactured from bones, which consist in part of phosphate of lime, or from native mineral phosphate of lime. Common phosphorus when pure is almost transparent and colorless. At common temperatures it is a soft solid, easily cut with a knife, and the cut surface has a waxy luster; at 108° it fuses, and at 550° is converted into vapor. It is exceedingly inflammable. Exposed to the air at common temperatures it undergoes slow combustion, emits a white vapor of a peculiar alliaceous odor, appears luminous in the dark, and is gradually consumed. On this account phosphorus should always be kept under water. A very slight degree of heat is sufficient to inflame phosphorus in the open air. Gentle pressure between the fingers, friction, or a temperature not much above its point of fusion, kindles it readily. It burns rapidly even in the air, emitting a splendid white light, and causing intense heat. Its combustion is far more rapid in oxygen gas, and the light far more vivid. The product of the perfect combustion of phosphorus is phosphorous pentoxide or phosphoric anhydride, a white solid which readily takes up water, passing into phosphoric acid. Compounds of phosphoric anhydride with basic bodies are known as *phosphates.* Phosphorus may be made to combine with most of the metals, forming compounds called *phosphides.* When dissolved in fat oils it forms a solution which is luminous in the dark. It is chiefly used in the preparation of lucifer matches, and also in the preparation of phosphoric acid. It is of all stimulants the most powerful and diffusible, but on account of its activity highly dangerous. It can be safely administered as a medicine only in extremely minute doses and with the utmost possible caution. Phosphorus presents a good example of allotropy, in that it can be exhibited in at least one other form, known as *red* or *amorphous phosphorus,* presenting completely different properties from common phosphorus. This variety is produced by keeping common phosphorus a long time slightly below the boiling point. It is a red, hard, brittle substance, not fusible, not poisonous, and not readily inflammable, so that it may be handled with impunity. When heated to the boiling point it changes back to common phosphorus.

Pho′tius, a patriarch of Constantinople, born of patrician parents in that city early in the ninth century. His wealth and interest raised him to the highest offices of the state. while he enjoyed the reputation of being the most universally learned and accomplished man of his age. He became secretary of state under the Emperor Michael III, and contracted an intimacy with the minister Bardas, uncle of the emperor On the deposition of the pa-

triarch Ignatius, Bardas persuaded the emperor to raise Photius to the patriarchal dignity The installation was recognized by the metropolitans of the patriarchate, but was opposed by Pope Nicholas I, whom Photius soon after excommunicated, thereby laying the foundation of the schism between the Eastern and Western churches. But the Emperor Michael having been murdered in 867 by Basil, who was raised to the throne, that prince immediately replaced Ignatius in his office, and banished Photius, who, however, resumed his dignity on the death of Ignatius in 878. On the accession of Leo, son of Basil, to the imperial throne in 886, Photius was again deposed and banished to a monastery in Armenia, where, in 891, his death took place. Photius was an able ecclesiastical statesman, and a man of great intellect, erudition, and literary power. His chief work, the *Myriobiblion*, may be described as an extensive review of ancient Greek literature.

Photo-engraving, a common name of many processes in which the action of light on a sensitized surface is made to change the nature or condition of the substance of the plate or its coating, so that it may by processes be made to afford a printing surface corresponding to the original from which the photographic image was derived.

Photography (Greek, *photos*, light; and *grapho*, to write), is the art of writing or drawing by light; taking representations of objects by the action of light through the lenses of a *camera obscura*, or on a previously prepared surface. The perfection of photography has not been reached and its successful manipulation is of comparatively recent date, although as early as the beginning of the present century likenesses of persons had been finished on glass. The first part of the year 1809, Thomas Wedgewood discovered a way of making crude profiles by the action of light upon nitrate of silver. He also made many experiments and succeeded in making the first copies from paintings. France added to the early progress in photography when, in 1814, M. Nicephore Niepes discovered a method whereby he produced pictures on plates of metal coated with asphaltum, at the same time rendering them permanent.

Daguerre, in 1839, announced what was the foundation of photography as we have it today. By means of the Daguerreotype, which was printing the detail on sensitized glass, and by the use of a shadow plate, the full effect of a photograph was wrought out. This great discovery was followed rapidly by others. Henry Fox Talbot found a process whereby he was able to produce pictures in the camera by the agency of light on paper coated with chloride and nitrate of silver. One of the great features of his formula was that the impressions were made permanent. The process was called Calotype (from *kalos*, fair, and *typus*, an impression). In the course of his experiments, covering a period of four years, he made many improvements, and in 1841 he secured several patents. The process is known to students as Talbotype. Each succeeding year added new ideas in the art of photography. Among the most important processes which followed were those of M. Niepee de St. Victor and Scott Archer. The former introduced the use of albumen paper, and the latter that of collodion as a substitute for paper. In both processes the substances were spread over a plate of glass. In 1851 Mr. Archer perfected the "wet plate" process, and full working details were published. It has been with these same wet plates that some of the most notable results in photography have been obtained. In 1856, Dr. Hill Norris explained the process of collodion dry plates. The year 1864 brought out the collodion emulsion dry plates by Messrs. Sayee & Bolton. Dr. R. L. Maddox was the founder of the gelatin plate process, and in 1871 he successfully completed his experiments, finding that glass plates could be coated with an emulsion consisting of bromide of silver contained in gelatin. Bennet added a number of improvements to the handling of dry plates in 1878, and the outcome was that in two years the process came into general use and since its advantages over past methods have been discovered it is almost the only process now employed. In 1887 some startling advances were made in color photography, and Mr. Mayall made known the secret whereby objects might be photographed in natural colors. Blue and red were the first colors to be found, but so far it has been impossible to bring into harmony that other primary color, yellow.

It has been announced from time to time that color photography was an accomplished fact. Such was the case when the Cellerier-Parks process was brought forward but its perfection lies in the future. The gelatin plate has done much toward the advancement of photography, and its applications are endless. The hand camera and the instantaneons shutter have given the world pictures of people and animals in action, the positions of which could never have been caught by a human eye. Many improvements have been made in the instantaneous shutters since 1890. They are now so carefully adjusted by mechanical appliances that they can be regulated to $\frac{1}{300}$ of a second, or a prolonged exposure can be given the subject at will. Through the instantaneous process scientists have been able to analyze muscular movements and the various modes of locomotion. Pictures of the most remote part of the heavens have been made common by photography, and the study of astronomy has been greatly advanced. Its application in the various processes of book illustration has also been very successful. Photography by the use of artificial light has also been very successful and has reached a degree of perfection.

In 1895, Thomas Edison discovered that by means of the X-rays, photographs could be taken looking through the body, showing the bones. His discovery has proved to be quite accurate in locating bullets in the human body. Photographing through any substance, wood or stone, and showing the interior contents has

been the outcome of this process and is known as the X-ray photography. Lenses and shutters have been so arranged as to take a series of passing people and faithfully portray every motion of the person or persons photographed. Photographs may be either negative or positive. Negative photographs are produced in the camera, and exhibit the lights and shades contrary to nature, that is, the lights dark and the shades light. In order to obtain positives or prints several methods are employed. In silver printing, a paper senitized by being floated on a solution of albumen mixed with common salt and then on a solution of nitrate of silver, is placed in close contact with the negative in a printing-frame and exposed to the light until the silver compounds have been sufficiently darkened. It is afterwards toned, fixed, and washed.

In the "bromide" process the paper is coated with a sensitized gelatin solution and positive prints are made by contact or by the enlarging camera, employing either day or artificial light. In the platinotype process the paper is sensitized by *ferric oxlato* and a double salt of potassium and platinum. The latter process requires no toning and produces a permanent print. This process was first discovered in 1855 by M. Poitevier, who combined carbon with gelatin, starch, or gum, applied it over the surface of paper, dried it, submitted it to the action of light under a photographic negative and so produced what is now known as a carbon print. The idea was not brought to perfection until 1864 when Mr. Swan of England, whose idea it was to prepare a solution of gelatin and bichromate of potash (the latter being the sensitizing agent), mixed with a black pigment and apply the mixture as a coating to a sheet of paper and print the positives on the black tissue, as it is called.

Walter Woodbury discovered a process whereby the hardened tissue is brought into contact with a plate of type metal, under considerable pressure. The plate takes the impression of the relief and pictures are printed from it instead of from the raised tissue.

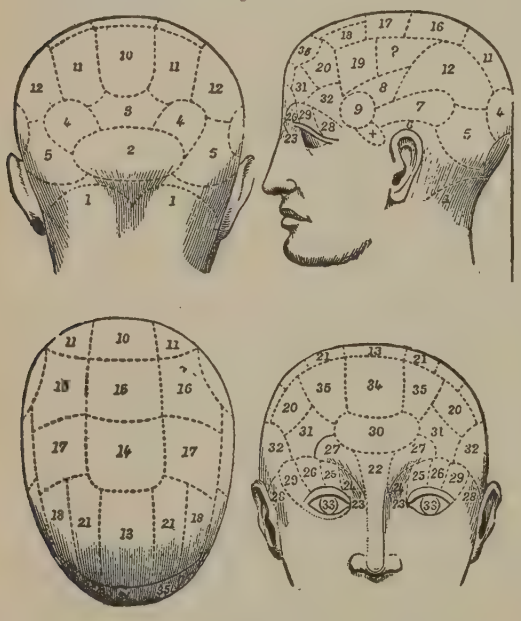
Photography has brought about many improvements in the art of lithography. Photolithography, the process of reproducing copies of photographs and painting from a lithographic stone, was discovered in 1859 by Asser of Amsterdam. The most common methods used in multiplying photographic pictures by photolithography is to take a print on paper sensitized with gelatin and bichromate of potassium and then ink it with a suitable oily ink. This ink adheres to the parts acted on by the light and has become insoluble, but when the gelatin is still soluble the ink can easily be wiped off with a soft cloth. The process is completed by transferring to the lithographic stone in the usual way. Photozincography has been one of the discoveries of the past twenty-five years. The process consists in projecting an impression on a plate of prepared zinc by photography, and then etching and engraving with acids so that any number of impressions can be made from the plate. Photography has been so simplified that amateurs have been able to secure results, some of which have equalled that done by professionals.

Photogravure.— By this process the finest possible results are obtained, but the expense of producing pictures by its aid, which is akin to the operation of copperplate printing, limits its use to high-class book work. It is also used for the production of large pictures which rival the finest steel engravings in their delicacy and finish. Photographs can be reproduced in this form, but the process seems to be more largely employed for obtaining engraving-like copies of celebrated pictures. The process is so perfect that every touch of the painter's brush is clearly seen in the copy, and even the upstanding ridges of paint in the bolder touches are rigidly reproduced. There are naturally different ways by which printing plates for use in this process are made, and a brief description of two methods only must here suffice to give an indication of the line of operations. (1) A gelatin relief is obtained by exposing bichromated gelatin to the action of light beneath the negative. But the gelatin employed is mingled with a certain quantity of graphite (black lead) in a more or less granular form. This addition causes the resulting relief to have a surface which is granular in character, and which is also a conducting one to electricity. If therefore the relief be placed in an electrotype bath it will speedily become covered with a deposit of copper. From the copper plate so formed copies on paper can be obtained by the usual copperplate printing process. (2) A bichromated gelatin print — negative in character — is developed upon the specially prepared surface of a copper plate, which is then subjected to the action of a solution of perchloride of iron. This penetrates the gelatin more or less quickly according to its varying thickness, and then attacks the copper, which is eaten away by the chemical action that ensues. Thus in the end the copper plate bears on its surface an etched image, penetrating more or less in depth according to the shadows and lights of the gelatin image previously affixed to it. The plate is next "steel"-faced and printed in the copper-plate press.

Photometry (Gr. *phōs*, "light," and *metron*, "measure"), the art of measuring the intensity of a source of light, by comparison with a standard of reference. Instruments have been devised for applying the many different methods to each part of the spectrum of the light from each source. The degree of sensitiveness of the eye of the observer, or a difference of sensitiveness between his two eyes, affects the result. In other instruments used as photometers what is measured is not the luminous itensity so much as the radiation. Stellar photometry is generally contrived by stopping off more or less of the surface of the object glass, or by polarizing apparatus, so as to bring the apparent brightness of a star down to that of a standard of comparison.

Pho'tophone, an instrument invented in 1880 by Prof. Graham Bell, which resembles the telephone, except that it transmits sounds by means of a beam of light instead of the connecting wire of the telephone. The success of the instrument depends upon a peculiar property of the rare metal selenium, that, namely, of offering more or less opposition to the passage of electricity according as it is acted upon or not by light. In its simplest form the apparatus consists at the receiving end of a plane mirror of some flexible material (such as silvered mica) upon which a beam of light is concentrated, and the voice of a speaker directed against the back of this mirror throws the beam of light reflected from its surface into undulations which are received on a parabolic reflector at the other end, and are centered on a sensitive selenium cell in connection with a telephone, which reproduces in articulate speech the undulations set up in the beam of light by the voice of the speaker.

Phrenology, the term applied to the psychological theories of Gall and Spurzheim, founded upon 1, the discovery that the brain, as the organ of the mind, is not so much a single organ as a complex congeries of organs; and 2, observations as to the existence of a certain correspondence between the aptitudes of the individual and the configuration of his skull. Phrenology may therefore be regarded as a development, partly scientific and partly empirical, of the general idea that a correspondence exists between the physical structure and the psychical and mental traits of every individual man or animal. It was long ago observed by physiologists that in animals a certain character and intelligence seemed to accompany a certain formation and size of skull. Lavater, in his system of physiognomy, went further than this, and gave to particular shapes of the head certain powers and passions; the conical head he terms *religious;* the narrow retreating front, *weak-minded;* the broad neck, *salacious;* etc. But it was reserved to Drs. Gall and Spurzheim to expand this germ of doctrine into a minute system, and to map out the whole cranium into small sections, each section being the dwelling place of a certain faculty, propensity, or sentiment. Gall first started this so-called science; but to Spurzheim it is mainly indebted for its systematic arrangement, and to Dr. Combe of Edinburgh for its advocacy. Gall commenced giving private lectures on the subject in 1796. In 1800 he was joined by Spurzheim, who continued his colleague till 1813, both conducting their researches in common, and traveling together from place to place. At Paris their theories were investigated by a commission of the Institute of France, the result being an unfavorable report drawn up by the celebrated Cuvier. In 1814 Spurzheim went to England, where his lectures gained many disciples, among others George Combe of Edinburgh, one of the best expounders and defenders of phrenology which the science yet can boast. Spurzheim eventually came to America, where he d. in 1832.



AFFECTIVE.

I.—Propensities.

1. Amativeness.
2. Philoprogenitiveness
3. Inhabitiveness or Concentrativeness.
4. Adhesiveness.
5. Combativeness.
6. Destructiveness and Alimentiveness.
7. Secretiveness.
8. Acquisitiveness.
9. Constructiveness.

II.—Sentiments.

10. Self-esteem.
11. Love of Approbation.
12. Cautiousness.
13. Benevolence.
14. Veneration.
15. Firmness.
16. Conscientiousness.
17. Hope.
18. Wonder.
19. Ideality.
20. Wit. 21. Imitation.

INTELLECTUAL.

I.—Perceptive.

22. Individuality.
23. Form.
24. Size.
25. Weight.
26. Coloring.
27. Locality.
28. Number.
29. Order.
30. Eventuality.
31. Time. 32. Tune.
33. Language.

II.—Reflective.

34. Comparison.
35. Causality.

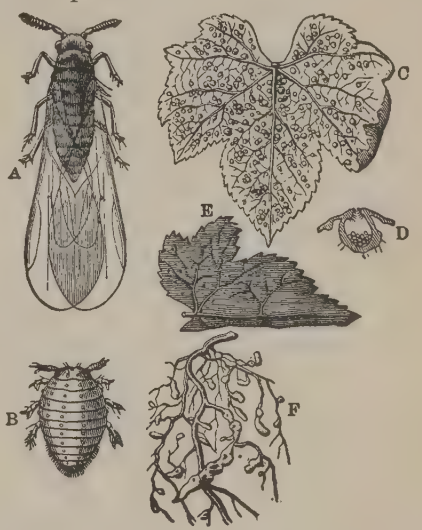
sented by Bain, Carpenter, Ferrier, Wagner, Huschke, and others.

The empirical side of phrenology, sometimes called *craniology*, rests upon the assumption that the relative development of the centers of the brain can be accurately determined by an external examination of the protuberances and depressions of the skull. Craniology is admitted to have a certain degree of foundation in the general truths of physiology, but it cannot pretend to scientific exactness or well-reasoned theory, and in the hands of those who know it best it usually makes no such claim. Its conclusions, like its data, are uncertain and general, because in attempting to delineate a man mentally, morally, and physically, there are so many things other than the external shape of the skull which have to be taken into account, and also so many things of essential importance of which it is impossible to take account. For example, the cranium may be small, and yet, owing to the depth of the furrows, the cortex or thinking membrane of the brain may be large; on the other hand, owing to the superficial nature of the furrows, a large cranium may co-exist with a very limited development of cortex; and such a fact as this, it is obvious, is unverifiable in any special instance without *post mortem* examination.

Phrygia, in ancient geography a region comprising the western central part of Asia Minor, containing the cities Apamea, Laodicea, and Colossæ. The inhabitants were early civilized, and paid much attention to grazing and tillage. The early history of Phrygia is mythological. Several of its kings are mentioned of the names of Gordius and Midas. On the death of Adrastus (B. C. 560) the royal family of Phrygia became extinct, and the kingdom became a province of Lydia. It afterward formed a part of the Persian, and still later of the Roman Empire.

Phyllop′oda ("leaf-footed"), an order of Crustacea, possessing numerous feet, numbering eight pairs at least, the first pair being natatory in character. The feet are of foliaceous or leaf-like structure, and are provided with branchial appendages, adapted to subserve the breathing or respiratory function. The carapace, or shelly covering protecting the head and chest, may be well developed, or the body may be destitute of a covering. In their development the Phyllopoda pass through a metamorphosis; and in their earliest state the embryos appear as in the "nauplius" form.

Phylloxe′ra, a genus of plant lice, family Aphidæ, order Hemiptera. The type of the genus is *Phylloxera quercus*, a species which lives upon oak trees; but the *Phylloxera vastatrix*, or grape Phylloxera, a species which injuriously affects the vine, has attracted so much attention of late years that it has come to be known as *the* Phylloxera. It presents itself in two types, the one gall-inhabiting (*gallicola*), and the other root-inhabiting (*radicola*). Its proper home is North America, where it was known early in the history of grape culture, and where it doubtless existed on wild vines from time immemorial. It was discovered in England in 1863, and about the same time it made its appearance in France, where it committed great ravages, inflicting immense loss upon the owners of vineyards. Widening its area not only by natural means, but also by commerce in vines and cuttings, it was carried from infected to non-infected districts, and spread to Spain, Portugal, Switzerland, Austria, Prussia, and to all the grape-growing countries of Europe. Only where the soil was of a sandy nature did the vineyards escape. In 1885 its presence was discovered in Austra-



Life-history of Phylloxera. A.—winged female; B.—wingless female from the root; C.—under surface of a vine leaf, showing the wart-like galls; D.—an enlarged section of one of the galls, showing the eggs within it; E.—upper surface of a vine leaf, showing the openings of the galls; F.—some of the roots of the vine, showing the nodosities caused by the parasites.

lia, at the Cape of Good Hope, and in Algeria; and, generally speaking, it has now obtained a foothold, at least in restricted localities, in every country where the grapevine is cultivated. Vines attacked by Phylloxera generally show external signs the second year of attack in a sickly yellowish appearance of the foliage and in stunted growth, and the third year they frequently perish, all the finer roots having decayed and wasted away. Many remedies have been proposed, but none are universally practicable or satisfactory.

Physical Geography is that branch of geography which treats of the surface of the earth, or of any part of it as regards its natural features and conformation, the changes that are constantly taking place and that have formerly taken place so as to produce the features now existing; it points out the natural divisions of the earth into land and water, continents, islands, rivers, seas, oceans, etc.; treating of the external configuration of mountains, valleys, coasts, etc.; and of the relation and peculiarities of different portions of the water area, including currents, wave-action, depth of the sea, salt- and fresh-water lakes, the drainage of countries, etc. The atmosphere in its larger

features is also considered, including the questions of climate, winds, storms, rainfall, and meteorology generally. Lastly it takes up various questions connected with the organic life of the globe, more especially the distribution of animals and plants, and their relation to their environment; tracing the influence of climate, soil, natural barriers or channels of communication, etc., upon the growth and spread of plants and animals, including in the latter the various races of man. The field of physical geography is thus by no means easy to confine within strict limits, as it is so closely connected at various points with geology, mineralogy, botany, and zoology, chemistry, ethnology, etc.

Physick, Philip Sing (1768-1837), surgeon, was b. in Philadelphia, Pa. He graduated at the University of Pennsylvania in 1785. In 1791 was licensed by the Royal College of Surgeons in London. In 1805 was made professor of surgery in University of Pennsylvania. In 1825 was elected member of the French Academy of Medicine, and in 1836 honorary fellow of the Royal Medical and Chirurgical Society of London. One of his most brilliant successes was that of enterotomy on Chief Justice Marshall, which resulted in the removal of over 1,000 calculi and a perfect cure. He introduced numerous valuable instruments and improved modifications of others, and applied novel methods of treatment. He was called the "Father of American Surgery."

Physics (or Physical Science) (Gr. *physikos*, "natural"), comprehends in its widest sense all that is classed under the various branches of mixed or applied mathematics, natural philosophy, chemistry, and natural history, which branches include the whole of our knowledge regarding the material universe. In its narrower sense it is equivalent to Natural Philosophy which until of late years was the term more commonly used and denotes all knowledge of the properties of bodies as bodies, or the science of phenomena unaccompanied by essential change in the objects; while chemistry is concerned with the composition of bodies, and the phenomena accompanied by essential change in the objects, and natural history, in its widest sense, includes all the phenomena of the animal, vegetable, and mineral world. See the different articles.

Physiog'nomy, the doctrine which teaches the means of judging of character from the countenance. Aristotle is the first who is known to have made any attempts in physiognomy. He observed that each animal has a special predominant instinct; as, the fox cunning, the wolf ferocity, etc., and he thence concluded that men whose features resemble those of certain animals will have similar qualities to those animals. Baptista della Porta, in his work *De Humana Physiognomia* (1586), revived this theory and carried it out further. The theory was adopted and illustrated by the French painter Lebrun, in the next century, and by Tischbein, a German painter of the eighteenth century. The physiologist Camper sought new data in a comparison of the heads of different types of the human species, and in attempting to deduce the degree of intelligence belonging to each type from the size of the facial angle. Lavater was the first to develop an elaborate system of physiognomy, the scope of which he enlarged so as to include all the relations between the physical and moral nature of man. It is a subject of great interest, but one must be on his guard against a general application of the rules which experience seems to have furnished him.

Physiology is the science which treats of the various processes or changes which take place during life in the organs and tissues of a body whether animal or vegetable. We learn from *Embryology* that the human body begins its development as a minute cell or *ovum* about 1-120 of an in. in diameter and consisting of a spherical mass of protoplasm containing a nucleus called the *germinal vesicle.* It is important, therefore, to have a correct knowledge of the nature and activities of the cell, as this constitutes the foundation of physiology. A cell is a nucleated mass of protoplasm of microscopic size. The life principle, the protoplasm, is a semi-fluid, weakly alkaline substance, transparent, generally colorless, and made up of granules of albuminous, fatty, and other material, which exhibits a peculiar vibratory movement called "Brownian movement."

The vital or physiological characteristics of protoplasm are, 1, Power of spontaneous movement. 2, Power of response to stimuli—irritability; (a) Change of temperature; (b) mechanical stimuli; (c) chemical stimuli; (d) Electrical stimuli; (e) Nervous influences. 3, Power of digestion, respiration, and nutrition. 4, Power of growth. 5, Power of reproduction.

The essential feature of living matter is its instability; it is the seat of chemical changes collectively called metabolism. These changes are subdivided into 1, constructive or anabolic, in the course of which non-living matter is annexed or assimilated by living matter; 2, destructive or katabolic, in course of which living matter and storage substances are expended.

Living matter is supplied by food, the potential energy of which is utilized in the course of analytical changes which fall mainly upon the storage substances and involve living substances only to a very small extent. A living body, considered simply as a mass of living matter, possesses a fund of potential energy derived from the previous storage and assimilation of foreign matter. The lowest form of living matter is a simple cell, e. g., *Amœba.* The highest form is the human body.

In all living organisms a physiological division of labor is associated with an anatomical differentiation of structure. The organism is a community; its individuals are cells; its groups of individuals are organs.

In any animal above the lowest type the following principal tissues are recognized: 1, blood; 2, epithelium; 3, connective tissue; 4, nervous tissue; 5, muscular tissue.

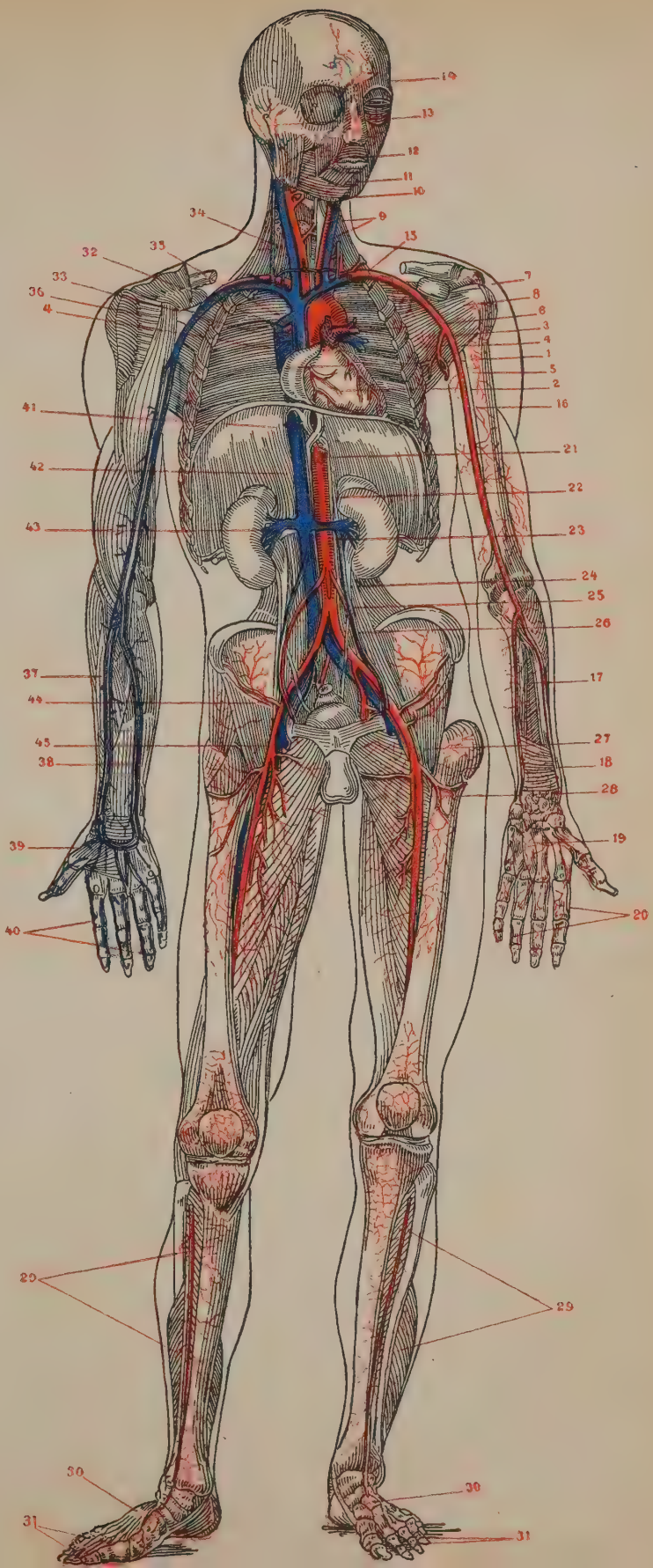
The *functions* attributed to these tissues

THE BLOOD VESSELS

after opening the large cavities of the body and removing the muscles.

On the right side the veins are blue; on the left the arteries are red.

1. Right Auricle.
2. Right Ventricle.
3. Pulmonary Artery.
4. Pulmonary Veins.
5. Left Ventricle.
6. Ascending Aorta.
7. Arch of the Aorta.
8. Descending Aorta.
9. Carotid Artery.
10. Lingual Artery.
11. Internal Maxillary Artery.
12. Labial Artery.
13. Temporal Artery.
14. Supra-Orbital Artery.
15. Subclavian Artery.
16. Brachial Artery.
17. Radial Artery.
18. Ulnar Artery.
19. Superficial Palmar Arch.
20. Digital Artery.
21. Short Abdominal and Superior Mesenteric Artery.
22. Abdominal Aorta.
23. Renal Artery.
24. Inferior Mesenteric Artery.
25. Internal Spermatic Artery.
26. Internal Iliac Artery.
27. Femoral Artery.
28. Deep Femoral Artery.
29. Anterior Tibial Artery.
30. Dorsalis Pedis Artery.
31. Arteries of the Toes.
32. Superior Vena Cava.
33. Azygos Vein.
34. Internal Jugular Vein.
35. Subclavian Vein.
36. Axillary Vein.
37. Radial Vein.
38. Ulnar Vein.
39. Venous Arch (Palmar).
40. Veins of Finger.
41. Portal Vein.
42. Inferior Vena Cava.
43. Renal Vein.
44. Internal Iliac Vein.
45. Femoral Vein.



are: 1, The distribution of food material and the removal of waste material by the blood. 2, The digestive preparation and absorption of food material and the rejection of waste matter by the epithelium of the secretory and excretory glands. 3, Mechanical support, connection, and preservation of form by the connective tissue. 4, Control of action and communication between parts by the nervous tissue. 5, Internal and external mechanical movements by muscle.

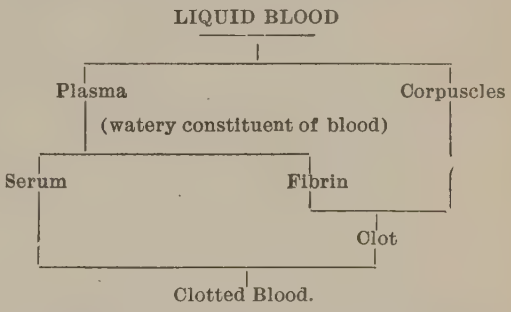
From a physiological point of view we distinguish the following principal organs: 1, of digestion; 2, of respiration; 3, of circulation; 4, of excretion; 5, of reproduction: 6, of movement; 7, of control. These organs are derived from the layers of the embryonic blastoderm, the epiblast, mesoblast, and hypoblast. In studying the functions of the body physiology must call to its aid, anatomy, chemistry, physics, etc. Given a knowledge of these essentials, one can study the physiological processes and consequences by exact observation and by insulative experiments upon the lower and higher animals. The complicated functions of the human body are the highest expression of physiological activity. The functions of the simple protoplasmic cells are its lowest and earliest manifestations.

The essential income of all living matter is made up of the six proximate principles: proteid, fat, carbohydrate, salts, water, and oxygen. The three most important elements which they contain are carbon, nitrogen, and oxygen. At least two-thirds of the body weight is made up of water. With these general considerations in view, we must take up the specific functions of the body.

I, The Blood and Circulation.

(*a*) *Blood* is the fluid medium by means of which all the tissues of the body are directly or indirectly nourished; by means of it also, such of the materials resulting from the metabolic processes, as are of no further use in the body economy, are carried to the excretory organs to be removed from the body. A regular supply of healthy blood is an essential condition of the life of the animal body. The quantity of blood in the body holds a definite proportion to the body weight and is from $\frac{1}{12}$ to $\frac{1}{14}$ of the entire weight. Blood is a slightly viscid alkaline fluid varying in color from bright scarlet to dark purple. Owing to the presence of sodium chloride blood has a saltish taste and it possesses a faint indescribable odor. The most important characteristic of blood is its coagulability. This is the phenomenon which is observed when blood is drawn, or which may occur in certain pathological conditions in the living body. Left undisturbed for two or three minutes after being drawn the blood becomes more and more viscid; as time goes on a red jelly-like substance results; the jelly shrinks, gets firmer, and squeezes out drops of almost colorless liquid (serum). The clotting is due to the development in the blood of a substance called fibrin, which appears as a meshwork, entangling and enclosing within itself the blood corpuscles. Several theories as to the source of this fibrin and as to the essentials for coagulation have been advanced; suffice it to say that the work of Alex Schmidt, Hammerston, Wooldridge, Pekeldering, Lilienfeld, and others has thrown great light upon this subject.

The following diagram may make the point clearer:—



Coagulation is hastened by 1, moderate warmth; 2, rest; 3, contact with foreigh matter; 4, free access of air; 5, addition of water (less than twice its bulk). It is retarded by 1, cold; 2, addition of water (more than twice its bulk); 3, addition of neutral salts; 4, contact with living tissue; 5, imperfect aeration; 6, inflammatory states of system; 7, exclusion of air; 8, addition of strong acids and alkalies.

A small drop of blood examined under the microscope, is seen to be composed of a number of corpuscles floating in an invisible fluid, the *plasma*. These corpuscles will be seen to consist of two kinds, 1, colored corpuscles numbering about 5,000,000 to the c.m. and forming about 45 per cent. by weight of the whole mass of blood; 2, colorless corpuscles numbering about 6,000 to the c.m. A description of these corpuscles will not be given here; suffice it to say that the red corpuscles are the agents by which the oxygen, needed by the tissues, is brought to them and the carbon dioxide received in exchange for the oxygen given off. This property of carrying oxygen is inherent in the hemoglobin, the coloring matter of the corpuscle. The white corpuscles are factors in inflammatory processes and in other conditions such as phagocytosis. The number and quantitative composition of these corpuscles do not remain constant in disease, as we may have an excessive reduction in the relative amount of hemoglobin in each corpuscle. These conditions give rise to anemia, etc.

The chemical composition of the blood is quite constant. One hundred gms. of blood consist of 80 gms. of water and 20 gms. of solids (hemoglobin, proteids, carbohydrates, fats, salts, etc.). In solution and in combination in this 100 gms. of blood we find about 60 c.c. of the gases carbon dioxide and oxygen, whose relation, the one to the other, varies according as the blood is arterial or venous. The composition of the blood is affected by 1, age; 2, sex; 3, temperament; 4, pregnancy; 5, diet.

Circulation of Blood.—The blood does not remain stagnant, it does not ebb to and fro, it

Physiology

circulates. This conclusion was not reached until 1628, when Harvey discovered that the blood passes from the left ventricle, through the system, to the right ventricle. Harvey's premises to this conclusion were: 1, the disposition of valves in the veins and in the heart; 2, the pulse in the arteries coincident with the systole of the ventricles; 3, the great size of the minimum volume of blood that must be driven into the arteries within a short space of time; 4, the spurting of blood from the cardiac end of an artery; 5, abundant escape of blood from the peripheral end of a vein; 6, effects of very tight and moderate ligatures of the arm upon vessels of the forearm.

The description of the heart and vessels will not be taken up, as that belongs to the domain of anatomy. In a general way the heart can be considered as consisting of four chambers, two auricles and two ventricles. The arteries lead from the ventricles; the veins lead to the auricles. Outside the heart the blood flows from ventricle to auricle through arteries, capillaries, and veins. Inside the heart the blood flows from auricle to ventricle.

A drop of blood will complete its circulation as follows: 1, Systemic or greater circuit: left auricle—left ventricle—systemic arteries —systemic capillaries—systemic veins—right auricle. 2, Pulmonary or lesser circuit: right ventricle — pulmonary arteries — pulmonary capillaries—pulmonary veins—left auricle.

The human heart contracts with regularity at a rate of about 70 per minute; each contraction or active period is followed by a passive period. Contraction of any part of the heart is called its *systole.* Relaxation of any part of the heart is called its *diastole.* During systole the ventricles contract and empty themselves into the pulmonary artery and aorta; the semilunar valves are opened; the auriculo-ventricular valves are shut; the first sound of the heart is produced and is coincident with the carotid pulse. During diastole the ventricles are relaxed; the semi-lunar valves are closed; the auriculo-ventricular valves are open; the blood is flowing from auricles to ventricles; at end of diastole the auricles contract; the second or pulmonic sound is produced at the beginning of diastole. For the importance of these sounds, and for situation, etc., of cardiac impulses physical diagnosis should be consulted. Successive beats of the ventricles drive successive charges of blood into the arteries and produce a pressure of blood within them; the passage into the veins is impeded by the friction of the mass of blood against the walls of the capillaries and by the narrowness of the minute arteries leading into them. This resistance is spoken of as the "peripheral resistance."

The blood pressure is thus the resultant of 1, the heart's force; 2, the peripheral resistance; 3, elasticity of arteries. This is derived from heart's force. The average blood pressure in the human carotid artery is about 15–20 c.m. of mercury. The most characteristic feature of the flow of blood in arteries is its intermittency; and this intermittent flow is felt as the pulse. The practical value of the pulse consists in the fact that it affords means of judging of the state of the circulation. The frequency of the pulse is about 70 per minute in male, 80 in female, and is increased by exertion, by taking food, by stimulants, by emotion, in fevers, in debilitating disease; it is diminished during rest, during sleep, in cerebral coma, etc. The characters of the pulse are 1, frequency; 2, compressibility. These vary and constitute symptoms of disease.

The force and frequency of contractions of the heart depend upon: 1, properties and conditions of the heart muscle itself; 2, influence of the central nervous system; 3, the amount of blood passing into the heart's cavities; 4, the amount of pressure to be overcome.

The heart muscle possesses the peculiar property of automatic contractility. This property has been the subject of much scientific research, and space will not allow details concerning it. In regard to the influence of the central nervous system it can be said in brief that the heart is under the control of 1, the vagus (pneumogastric) nerve, whose action is to slow, or to inhibit, the beats, and 2, of the sympathetic nerve, whose action produces acceleration of the heart beats.

II, Respiration.—The maintenance of animal life necessitates the continual absorption of oxygen and excretion of carbonic acid. The term respiration is used for the visible act of breathing, and for the invisible gaseous exchanges taking place between the air and a living body. We must distinguish in the complete process of respiration two stages: external respiration or the mechanism of aeration; and internal respiration or the actual exchange of gases which take place in the tissues of the body. The essential function which is the property of every living cell is internal respiration; external respiration is accessory to it.

The process of respiration is divisible into four parts: 1, the mechanism of breathing, viz., the respiratory movements; 2, pulmonary or external respiration, viz., the exchange of gases taking place between the air and the pulmonary blood; 3, systemic or internal respiration, viz., the exchange of gases taking place between arterial blood and lymph or tissue; 4, the chemical changes which take place in living aerated tissue, i. e., the tissue-nutrition of which oxygenation forms part.

A brief summary is as follows: Oxygen, introduced into the lung by muscular movement, diffuses into the pulmonary blood and is conveyed to the systemic capillaries, whence it diffuses into the lymph and tissues; here it enters and forms part of some complex compound which subsequently yields carbon dioxide as a disintegration product; carbon dioxide diffuses from the lymph to the blood, and is therein carried to the lung, whence it diffuses into the air. In ordinary easy breathing a moderate amount of air is taken into the chest with each inspiration and given out with the succeeding expiration. This air is called the tidal air and amounts to about 30 cubic in. Beyond this tidal air it is possible to introduce

into the chest, by an extraordinary inspiratory effort, a further amount which is termed the "complemental air," and amounts to about 120 cubic in. The supplemental air is that amount which can be expelled by an extraordinary expiratory effort and amounts to about 90 cubic in. After the most complete possible expiration there is left in the lungs a quantity of air called the residual air, and it amounts to about 90 cubic in. The vital capacity is a term used to denote the amount of air which can be given out by the deepest possible expiration after the deepest possible inspiration. This amounts to about 250 cubic in. The capacity of equilibrium or stationary air is the cubic capacity of the chest after normal expiration, and amounts to about 200 cubic in. It is by a rapid diffusion of gases taking place between the stationary and the fresh tidal air that the former discharges carbon dioxide and is replenished with oxygen. Expired air as compared with atmospheric air contains about five per cent. less oxygen (O) and four per cent. more carbon dioxide ($C O_2$). It is warmer, saturated with moisture, fouled by organic emanations, and slightly diminished in volume. The minus quantity of oxygen is seen to be greater than the plus quantity of carbon dioxide; with this inequality corresponds the fact that the volume of expired air is slightly less than that of the previously inspired air.

The fraction denoting the ratio

$$\frac{\text{Vol } C O_2 \text{ exhaled}}{\text{Vol } O_2 \text{ absorbed}}$$

is called the respiratory quotient, and normally is about $\frac{4}{5}$.

A point of great practical importance relates to organic matter exhaled from the lungs. It is the chief factor in the fouling of the air. A rough guide to amount of respiratory impurity is the sense of smell. One part of $C O_2$ in 5,000 of air is the limit of expired $C O_2$ admissible in perfect ventilation. The normal amount of fresh air per head per hour which should be provided in order that air in dwellings should be healthy is about 3,000 cubic feet. The average frequency of respiratory movements is about 15 per minute, but it is variable, depending on sex, age, exercise, emotions, etc. Respiratory movements are characterized by various conditions, e. g., dyspnœa, asphyxia, apnœa, Cheyne-Stokes, breathing, etc.

Direct data relating to internal respiration are readily obtained from muscle, and the following summary will briefly state the facts:—

1. The activity of muscle respiration is determined by the activity of muscle, and not *vice versa.*

2. The consumption of oxygen is determined by the oxygen requirements of tissue, not by the amount of oxygen available.

3. The exhalation of carbon dioxide is the most reliable indicator of muscle respiration.

4. By integration of oxygen, a force-yielding storage substance is formed.

5. By disintegration of this substance (4) carbon dioxide is liberated in company with heat, work, acid, and an alteration of electrical potential.

Physiology

The changes which occur in the composition of the blood during its circulation take place in the tissues. The oxygen carried by the hemoglobin of the red corpuscles of the blood is given up to the tissues as the tension of the gas within them is very small. This oxygen thus set free is built up into the protoplasmic molecule and assists in metabolism. The process of katabolism is always attended by the evolution of carbon dioxide; as the blood passes through the tissues the high tension of this $C O_2$ in the tissues permits of its passage into the blood. Breathing compressed air lowers blood pressure. Breathing in rarefied air raises blood pressure. The movements of normal respiration are automatic and involuntary, but subject to occasional modification by the stimulation of afferent nerves and by voluntary interference.

The nervous mechanism consists of 1, a chief respiratory center in the spinal bulb; 2, afferent nerves (vagus, superior laryngeal, and fifth); 3, efferent nerves to the muscles of respiration. The vagus nerve contains fibers which stimulate inspiration and inhibit expiration, as well as fibers with the reverse effect. The superior laryngeal branch of the vagus inhibits inspiration and stimulates expiration.

III. Digestion.—The object of digestion is to bring the materials of the food into such a condition that they may be taken up by the blood and lymphatic vessels and so rendered available for the wants of the system. We see then that digestion is preparatory to absorption. Before absorption the food is outside the body, although in the intestinal canal; after absorption it is in the body, forming part of the nutritive fluids, blood and lymph.

Foods may be divided into two classes: 1, *Organic:* (a) nitrogenous substances (proteids) flesh, milk, eggs, etc., and (b) non-nitrogenous (1), starches and sugars; (2), oils and fats. 2, *Inorganic:* (a) mineral and saline matter; (b) liquid food containing chiefly water. Food in the intestine is acted upon by the series of secretions poured out by the glands in the walls of the digestive tract, and by glands (the pancreas and liver), the ducts of which open into that tract. These secretions, which are derived from the blood, are, saliva, gastric juice, bile, pancreatic juice, and succus entericus (intestinal juices), and their respective shares in the entire process are as follows:—

Proteids are digested by the agency of gastric juice and pancreatic juice; fats are digested by the agency of bile and pancreatic juice; starch by the agency of saliva and of pancreatic juice; cane sugar, by the intestinal juice. In all these cases the effect of digestion is to transform indiffusible into diffusible bodies and thus facilitate absorption. Absorption is not physically identical with diffusion, as is shown by the case of cane sugar, which although highly diffusible, does not pass unchanged. Absorption, therefore, depends upon two conditions, firstly, a physical condition—the diffusibility of the digested material; and a physiological condition — the selective activity of the epithelium through which absorp-

tion is effected. The essential constituent of each digestive fluid is a ferment, ptyalin in saliva, pepsin in gastric juice, trypsin, steapsin, amylopsin, and rennet in pancreatic juice, invertin in intestinal juice. These are the specific agents by which the digestive transformations of food are effected. They have never been isolated and are recognized to be present only by their effects. The chemical action of the digestive fluids is promoted by mechanical assistance; each mouthful of food is subdivided by mastication and propelled into the stomach by deglutition. The swallowed mass is well mixed with the gastric juice by the muscular action of the stomach wall. Reduced to pulp (chyme) it is squeezed into intestines and propelled onward by peristaltic movement.

Specific Action of the Various Secretions.

1. *Saliva.*—Ordinary saliva is a mixture of the secretions of the parotid, submaxillary, and sublingual glands. The average daily secretion is about 2¾ pints. It is composed of water, salts, mucin, serum-albumin, serum-globulin, and contains the ferment, ptyalin. The uses of saliva are mainly mechanical and in a small degree chemical. Saliva is necessary to aid mastication and deglutition, as neither can be performed with the mouth dry. Articulation is also aided by saliva, and the sense of taste is dependent upon saliva in so far as any solid substance must be dissolved before it can be tasted. The chemical action of saliva is the conversion of starch into sugar, and this conversion is brought about by action of the ferment, ptyalin. The secretion of saliva is under control of the nervous system directly by the chorda tympani nerve, which is vaso-dilator and secreto-motor of water; and by sympathetic nerves, which are vaso-constrictor and secreto-motor of organic matter.

2. *Gastric Juice.*—The secretion of the gastric glands is a colorless fluid containing pepsin and other ferments. Total quantity secreted in 24 hours is about $\frac{1}{10}$ of body weight; this must not be regarded as discharged from the body. It is re-absorbed in the small intestine. The chief function of the gastric juice is to convert proteids into peptones. This conversion is attended by the formation of several intermediate products and is completed by the formation of hemi- and anti-peptone. These end products have a different action in the body economy and will be discussed under the action of *pancreatic secretion.*

3. *Pancreatic Juice.*—The secretion is a colorless, transparent, slightly viscid liquid. The functions of this secretion are: 1, To convert proteids into peptones by action of the ferment trypsin. The intermediate products are almost the same as in gastric digestion—hemi-peptone and anti-peptone. The pancreatic juice converts the hemi-peptone into leucin and tyrosin; but does not affect the anti-peptone. 2, To convert starch into sugar by action of ferment, amylopsin. 3, To curdle milk by action of the ferment, rennet. 4, To emulsify oils and saponify fats by action of the ferment, steapsin.

Physiology

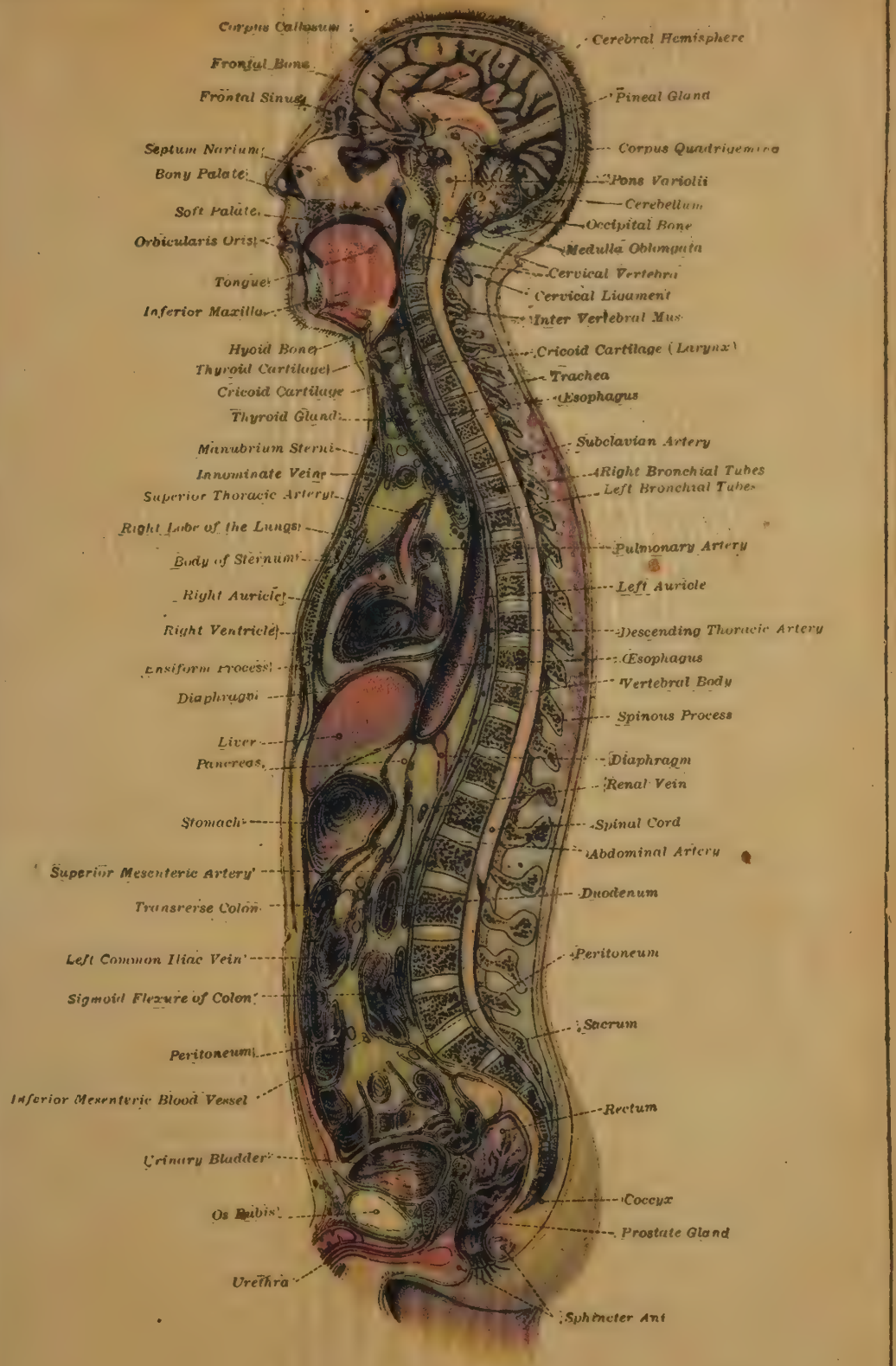
4. *Bile* is a somewhat viscid fluid of a yellow, reddish yellow, or green color. It contains salts, coloring matter, fatty substances, mucus, gas, etc. Its functions are: 1, it assists in emulsifying the fats, thus rendering them capable of absorption; 2, it facilitates absorption of fatty matter through the intestines by moistening the mucous membrane, 3, antiseptic of intestinal tract; 4, is a natural purgative; 5, it precipitates the gastric proteoses and peptones; 6, it is an excrementitious substance.

5. *Intestinal Juice* (*succus entericus*).—It is a yellowish alkaline liquid. It converts proteids into peptones, and starch into sugar, probably by action of the ferment, invertin. The evidence in favor of the action of the intestinal juice is quite insufficient to rely upon.

Summary of digestive changes in small intestines. The thin chyme, which, during the whole period of gastric digestion is being constantly squeezed into duodenum, consists of albuminous matter, fatty matter, starch, sugar, gastric juice, other fluids, etc. The special functions of small intestine in order are: 1, To alter fat so as to make it capable of digestion. This is done by saponification and emulsification. 2, To digest albuminous matter by pancreatic juice. 3, To convert starch into sugar. 4, Absorption of saline and saccharine matter.

IV. Excretion.— Respiration, digestion, circulation, and excretion are the agencies through which the blood is maintained of such quality and composition that it serves through life as the vehicle of nourishment and of purification to the whole body. Respiration is essentially a process of exchange, formed by a double current of gases, of incoming oxygen, and of outgoing carbon dioxide. Digestion and excretion similarly constitute a process of exchange, in which the two currents run in separate channels; carbon and nitrogen entering the body by intestinal absorption, but nitrogen leaving the body by renal excretion as urea, and carbon by respiratory excretion as carbon dioxide. The principal excretions are those due to the action of 1, lungs in excreting CO_2 and organic matter; 2, kidneys in excreting urea, etc.; 3, sweat glands of skin in excreting various products; 4, intestinal canal in excreting various unabsorbed products of defalcation. The excretion of CO_2 by the lungs has been discussed under respiration, and it must be borne in mind that this excretion of CO_2 is attended by an intake of oxygen.

Renal Excretion.—The structure of the kidneys is discussed under anatomy, but it is to be remembered that the arrangement of vessels and of excretory epithelium is such as to give the best opportunity for proper and complete elimination of waste products. The excretion or secretion of the kidneys is called *urine;* the average daily amount secreted is about 50 ounces. Urine is a transparent amber-colored liquid, of acid reaction, and a specific gravity of 1.015–1.025. It consists of water holding in solution certain organic matter (as urea, uric acid, kreatinin, xanthin, hippuric acid, etc.) and saline material (as phosphates, chlorides, sul-


Corpus Callosum
Frontal Bone
Frontal Sinus
Septum Narium
Bony Palate
Soft Palate
Orbicularis Oris
Tongue
Inferior Maxilla
Hyoid Bone
Thyroid Cartilage
Cricoid Cartilage
Thyroid Gland
Manubrium Sterni
Innominate Vein
Superior Thoracic Artery
Right Lobe of the Lungs
Body of Sternum
Right Auricle
Right Ventricle
Ensiform Process
Diaphragm
Liver
Pancreas
Stomach
Superior Mesenteric Artery
Transverse Colon
Left Common Iliac Vein
Sigmoid Flexure of Colon
Peritoneum
Inferior Mesenteric Blood Vessel
Urinary Bladder
Os Pubis
Urethra
Cerebral Hemisphere
Pineal Gland
Corpus Quadrigemina
Pons Variolii
Cerebellum
Occipital Bone
Medulla Oblongata
Cervical Vertebræ
Cervical Ligament
Inter Vertebral Mus
Cricoid Cartilage (Larynx)
Trachea
Œsophagus
Subclavian Artery
Right Bronchial Tubes
Left Bronchial Tubes
Pulmonary Artery
Left Auricle
Descending Thoracic Artery
Œsophagus
Vertebral Body
Spinous Process
Diaphragm
Renal Vein
Spinal Cord
Abdominal Artery
Duodenum
Peritoneum
Sacrum
Rectum
Coccyx
Prostate Gland
Sphincter Ani

Physiology

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Intestinal Juice (*succus entericus*).—It is a … into the stomach by d… fluid that converts proteids owed mass is well … sugar, and starch into sugar, promptly juice by the muscular action of the stomach … ferment, invertin. The evi- wall. Reduced … dence of the action of the intestinal into intestines and propelled … ferment to rely upon. staltic movement.

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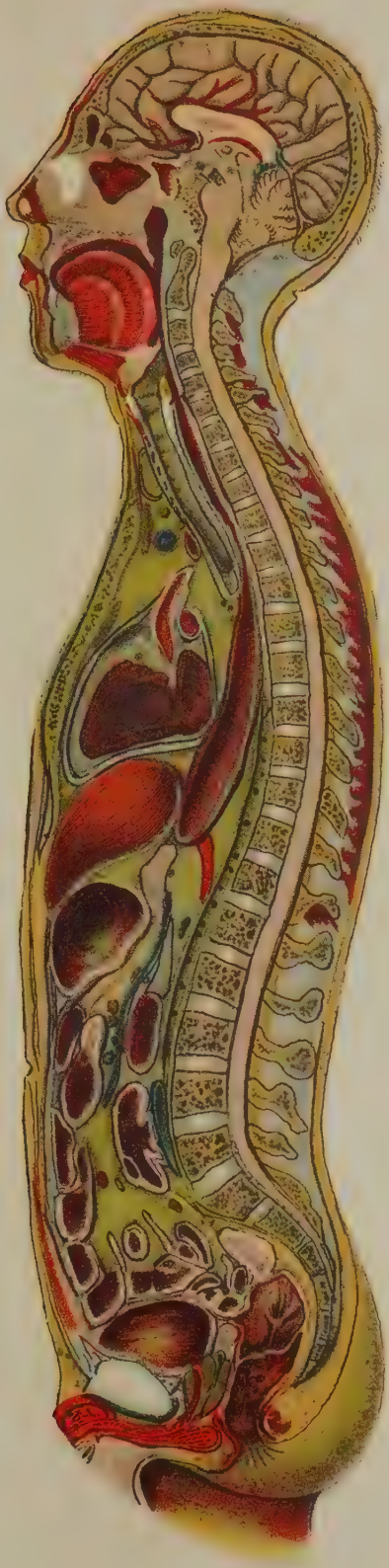
2 *Gastric Juice.*—The … the body by renal excretion … glands is a … by respiratory excretion. other ferments. … The principal excretions are hours is about … matter: 2, kidneys in excess not be regarded … products: 4, intestinal canal. It is re-absorbed in … absorbed products of … brief function … O_2 by the lungs proteids into … sed under respiration, and … ended by … in mind and body … ation of … by an intake of oxygen. … and anti-peptone. … *tion.*—The structure of the … products … ed under malpighian, but … ferment … that the arrangement of … functions of … tory epithelium is such as … proteids into … proper and … trypsin. … waste products. The … most the same … of the kidneys is called … peptone and … average daily amount secreted is … juice converts … Urine is a transparent and … and tyrosin; … liquid of acid reaction, and a specific … tone. 2, To … 1.015–1.025. It consists of water hold- action of … tion certain organic matter (as urea, … milk by … kreatinin, xanthin, hippuric acid … emulsify … saline material (as phosphates, chlorid… the ferment, steapsin.



phates, etc.) as its ordinary constituents; but in diseased conditions it may contain albumin, blood, sugar, bile, etc., in large quantities. The determination of the constituents of urine is one of the most important aids to diagnosis of certain conditions, and a thorough chemical, microscopical, and bacteriological examination of urine should always be made in cases of infectious diseases, diabetes, Bright's disease, etc.

The secretion of urine is an active process, not a passive filtration. The anatomical disposition of the renal vessels is such as to suggest filtration under high pressure at the glomeruli, secretion under low pressure by the convoluted tubules.

The renal action is supposed to consist of two processes: 1, Of filtration, by which water and ready formed salts are eliminated. This part of the renal function is performed in the Malpighian corpuscles by the renal glomeruli. The amount of fluid filtered depends upon the blood pressure in the glomeruli. All the causes which increase blood pressure will secondarily increase the secretion of urine. 2, Of secretion, by which certain substances forming the chief and more important part of the urinary solids are removed from the blood. It is to be remembered that the convoluted portions of the kidney tubules are lined with an epithelium which bears a close resemblance to the secretory epithelium of other glands, and that the Malpighian corpuscles and portions of the loops of Heule are lined by simple flattened epithelium.

As to the functions of the different parts of the uriniferous tubules two chief theories have been brought forward. (*a*) The cells of the convoluted tubes, by a process of true secretion, separate from the blood substances such as urea, whereas from the glomeruli are separated water and inorganic salts (Bowman, 1842). (*b*) In the glomeruli are filtered off from the blood all the constituents of the urine in a very diluted condition. This diluted urine, passing along the uriniferous tubules, is deprived of part of its water by absorption and thus becomes concentrated (Ludwig, 1844).

As each portion of urine is secreted it sends that which is already in the uriniferous tubes onward into the pelvis of the kidney. Thence through the ureter the urine passes into the bladder and thence by the muscular contraction of the walls of the bladder the urine passes on through the urethra and thus is excreted.

Excretory Action of the Skin.—The skin serves as: 1, an external integument for the protection of the deeper tissues; 2, a sensitive organ in the exercise of touch; 3, an important excretory and secretory organ; 4, an absorbing organ; 5, a regulator of the body temperature.

The skin, by virtue of its glands is an excretory organ. The substance excreted is almost exclusively water. The amount discharged varies. The excretion is called *sweat* and is usually formed so gradually that the watery portion escapes by evaporation as fast as it reaches the surface. The terms perspiration and sweat are used synonymously but a distinction is often made in that perspiration includes all that portion of the secretions of the skin that pass off by evaporation, or invisible perspiration; while sweat includes that which may be collected only in drops of fluid on the surface of the skin; this latter is termed sensible perspiration.

V. Food and Nutrition.—The living body yields energy in the form of work and heat. This result is brought about by chemical action. Matter is used up and becomes useless. Consumption of matter is thus a primary condition of vital activity, and it is necessary to the continuance of life that new matter should take the place of spent matter.

The foods, proteids, fats, and carbohydrates supply the necessary new matter, and are the primary source of all body energy. The essential waste products are urea and carbon dioxide. The essential elements in these waste products as well as in the food are nitrogen and carbon. Nitrogen enters the body in proteid and leaves it in urea. Proteid, by gastric and pancreatic digestion, becomes peptone, which is absorbed and retransformed into the proteids of plasma and lymph. These fluids surround and permeate the organized tissues, and the proteid that they carry forms the floating balance of nutritive material from which the fixed portion of living protoplasm is supplied. Of this free or circulating proteid only a small amount is actually taken into chemical combination in protoplasm as fixed or organ proteid, and the greater part of it is acted upon and used by living protoplasm. If a superfluous amount of proteid be taken into the body by the food the excess is converted into leucin and tyrosin, which being absorbed by the portal system is converted into urea by the agency of the liver. Thus to sum up, there are three roads from proteid, as taken into the body, to urea as excreted: 1, by leucin and tyrosin; 2, by circulating proteid; 3, by circulating and organ proteid.

Carbon enters the body in fat and in carbohydrates and leaves it in carbon dioxide. Some carbon enters the body in proteid and some hydrogen from fat leaves the body in water.

The intermediate stages between fat, starch, and sugar on the one hand, and carbon dioxide on the other are: 1, Carbon in proteid may become carbon dioxide immediately by the disintegration of proteid, or immediately after the previous formation of fat or of glycogen proteid. 2, Fat absorbed can exist in the body only as fat, and cannot give rise to proteid or to carbohydrates. The destiny of fat, whether recently absorbed, or previously deposited, is to be oxidized, yielding $C\,O_2$ and $H_2\,O$ (pure water) as its final products. Absorbed fat may thus be immediately oxidized or may be stored in the body to be oxidized when required. 3, Carbohydrates may be immediately absorbed and oxidized, yielding $C\,O_2$ or may be stored as a comparatively temporary reserve of glycogen in the liver.

The average daily discharge of a man weigh-

ing 150 pounds is, carbon, 230 grammes; nitrogen, 15 grammes. While the weight and health remain constant this daily export must be made good by an exactly equal import of carbon and of nitrogen in food. This condition is known as the state of *nitrogenous equilibrium.* The departures from this state of equipoised normal nutrition may be summed up as follows: 1, Gain or loss of nitrogen signifies gain or loss of flesh. 2, Gain or loss of carbon signifies gain or loss of fat. The condition of starvation necessarily follows where we have an increase of export over import. It is absolutely necessary that human food should include proteids, fats, and carbohydrates as well as salts, oxygen, and water. The absence of any of these proximate principles kills by starvation. An adequate diet should consist of 2 grammes of proteid, 1.5 grammes of fat, 6 grammes carbohydrate, 5 grammes salt per one kilogramme of body weight. The chief conditions modifying the amount of diet are: 1, work, 2, health, 3, age. To properly estimate the nourishing value of a food we must take into account its palatability and digestibility as well as its percentage of carbon and nitrogen.

VI. Animal Heat. — One of the most important results of the metabolism of the tissues is the production of the heat of the body. All animals are, as a rule, warmer than the air or water by which they are surrounded. Warm-blooded animals exhibit this excess of temperature to a far greater degree than cold-blooded animals, and whereas the temperature of the former varies little with large variations of the surrounding temperature, that of the latter varies considerably with this circumstance. The warm-blooded animal keeps at a constant temperature by reflex actions of a peculiar character, regulating the heat that is produced in the substance of the body, and the heat that is lost from the surface of the body; the cold-blooded animal has no such regulating power, and, consequently, no fixed or normal body temperature. The average temperature of the human body in those internal parts which are most easily accessible is from 98.5° to 99.5° F. This temperature is subject to variation according to age, sex, period of the day, exercise, climate and season, food and drink taken, disease, etc. The heat which is produced in the body arises from the metabolic changes of the tissues, the chief part of which are of the nature of oxidation. All chemical action taking place in the body is originally derived from food. Heat is dissipated by radiation and by evaporation from the surface of the body, only a small fraction (about $\frac{1}{25}$) of the total goes in the discharge of warm air and warm urine. In hot weather the skin is flushed with blood and moist with perspiration and superfluous clothing is put off; in cold weather the skin is pale and dry and extra clothing is put on. If heat production be diminished the consequence is, of course, a diminution of heat dissipation.

The heat-producing tissues are: 1, muscles; 2, secreting glands; 3, brain. The loss of heat from the body is principally regulated by the amount given off; 1, by radiation and conduction from its surface; 2, by constant evaporation of water from surface; 3, from air passages; 4, by warming cold foods. We must remember that the influence of the nervous system in modifiying the production of heat is very important, as upon this influence depends the amount of the metabolism of the tissues.

VII. The Nervous System.—Protoplasm is excitable. With higher organization of a mass of protoplasm, differences of function and of structure begin to make their appearance. The progressive elaboration of a nervous system with subdivision of function has its highest expression in the human brain. There is in the human brain a localization of function in different parts. This localization is best known in the cases of language, of voluntary motion and of sight, and, as regards voluntary motion in particular, it is possible to trace a correspondence between particular movements and the functional activity of special areas of the cerebral cortex. The central nervous cell is usually considered as a double cell, one part of which is at the central end of an efferent fiber. The first is called a sensory cell, the second a motor cell. These parts form a reflex arc and may be classified as central, peripheral, and intermediate. The central part is a nerve center or centers, the peripheral parts are the sensory organs and muscles, and the intermediate parts are the nerves, afferent and efferent.

The nervous system consists of the following parts: 1, Large masses of nervous matter situated within the bony cranium and spinal column, and constituting the brain and spinal cord. 2, Smaller masses of nervous matter constituting the sympathetic ganglia. 3, Cords of nerve fibers which connect the central nervous system with the periphery and the sympathetic ganglia. 4, Peripheral end organs. The office of nerve fibers is to conduct impressions. These nerve fibers may be stimulated to act by anything which, with sufficient suddenness, increases their irritability. They are incapable of originating of themselves the conditions necessary for the manifestation of their own energy. The effect of a stimulus upon a nerve depends upon the nature of its end organ. The velocity of a nerve impulse is 111 ft. per second in motor nerves, and 140 ft. per second in sensory nerves.

Cerebro-spinal system is composed of, 1, spinal cord and its nerves; 2, the brain made up of a cerebrum, crura cerebri, pons Varolii, cerebellum, medulla oblongata, etc. All these parts are nerve centers in contradistinction to the nerve trunks. The cerebro-spinal centers are distinguished from mere trunks by the possession of nerve cells, and the increase of function in the centers is, doubtless, due to the possession of ganglion cells.

Functions of nerve centers are: 1, *Reflex action.* A reflex is an immediate unchosen response to a peripheral stimulus. The relations between stimulus and effect are expressed by Pfluger's (1) Law of unilateral reflection; (2)

Law of symmetrical reflection; (3) Law of intensity; and (4) Law of radiation. 2, *Automatism.* An automatic act is a repeated or rhythmic involuntary response to a repeated excitation 3, *Inhibition and augmentation.* The descriptive anatomy of all the parts of the nervous system cannot be discussed here.

The brief account of function of spinal cord, etc., is: 1, Conduction—(*a*) Sensory impressions; (*b*) Motor impressions. 2, Reflex action—Cutaneous and muscle reflexes. 3, Special centers located in cord—Ano-spinal center; Vesico-spinal center; Genito-spinal center; Parturition center, etc.

The functions of the Medulla Oblongata; 1, Conduction; 2, Reflex action; 3, Special centers—(*a*) Simple reflex centers—mastication, deglutition, coughing, vomiting, etc. (*b*) Automatic centers—Respiratory center, Cardio-inhibitory center, Vaso-motor center, etc. (*c*) Control centers. (*d*) Tonic centers.

A brief conception of the *fundamental structure of the nervous system* is as follows: The nervous system is a combination of an immense number of units called *neurons,* composed of a cell body, of a protoplasmic process called a dendron and an axis cylinder process. The nutrition of the neurons depends upon the condition of the cell body. No neuron has an actual connection with any other, that is, there is no actual connection or continuity of their protoplasmic processes. Nervous impulses are transmitted from one neuron to the other by proximity or contact of parts. The protoplasmic processes conduct impulses to the cells and the axis cylinder processes conduct them away. The axis cylinder process after leaving the cell gives off at right angles lateral branches called collaterals, which split up into fine fibers forming the end brushes or arborizations. The processes run for the most part in the white matter of the brain and cord while the cell bodies of the neurons are collected together in the gray matter.

VIII. The Senses.—Through the medium of the nervous system the mind obtains a knowledge of the existence both of the various parts of the body and of the external world. This knowledge is based upon sensations resulting from the stimulation of certain centers in the brain. Under normal circumstances the following structures are necessary for sensation: 1, peripheral organ for the reception of the impression; 2, a nerve for conducting this impression; 3, a nerve center for preserving it.

Sensations may be classified as: 1, common; 2, special.

Common Sensation.—Under this head fall all those general sensations which cannot be distinctly localized in any particular part of the body, such as fatigue, discomfort, faintness, hunger, thirst, pain, etc. In this class of common sensations must also be placed the various irritations of the mucous membrane of the bronchi giving rise to coughing; also the sensations derived from various viscera; also sensations of itching, creeping, tingling, aching, burning, etc.

Special Sensations.—Touch, taste, smell, hearing, sight. The most important distinction between common and special sensation is that by the former we are made aware of certain conditions of various parts of our bodies, while from the latter we gain our knowledge of the external world also. It must be remembered that the sensorium or seat of sensation is in the brain and not in the particular organ through which the sensory impression is received.

Touch. Touch should be considered as a mere modification of common sensation. All parts of the body supplied with sensory nerves are, in some degree, organs of touch; yet the sense is exercised with perfection only in the parts the sensibility of which is extremely delicate, e.g., skin, tongue, lips, etc. Varieties of sense: (*a*) sense of touch proper, tactile sensibility; (*b*) temperature; (*c*) pain.

Taste. Conditions of perceptions of taste are: 1, Presence of a nerve and a nerve center; 2, The excitation of the nerve by sapid matters, which must be in a state of solution; 3, A temperature of about 95°–100° F. The principal seat of this sense is the tongue, but the soft palate, uvula, and tonsils are endowed with this sense. Varieties of taste: sweet and bitter; acid; alkaline; metallic.

Smell. Conditions necessary: 1, Special nerve and nerve terminations; 2, Mucous membrane of nasal cavity must be moist; 3, Odorous matter must be transmitted in a current through the nostrils. The sense of smell can discern the presence of almost infinitesimal quantities of a substance, thus 3–100,000,000 of a grain of musk can be distinctly smelled.

Hearing. The anatomy of the special sense organs will be found under the article on *Anatomy.* All the acoustic contrivances of the organ of hearing are means for conducting sound. The whole development of the organ has for its object merely the rendering more perfect the propagation of the sonorous vibrations and their multiplication by resonance.

The external auditory passages influence the propagation of sound to the tympanum in three ways: 1, by causing the sonorous undulations, entering directly from the atmosphere, to be transmitted by the air in the passage immediately to the *membrana tympani.* 2, By the walls of the passage conducting the undulations imparted to the external ear itself, by the shortest path to the attachment of the *membrana tympani.* 3, By the resonance of the column of air contained within the passage.

Sight. The optical apparatus may be supposed to consist of several parts: 1, Of a system of refracting surfaces and media by which images of external objects are brought to a focus upon the back of the eye. 2, Of a sensitive screen, the retina, which is a specialized termination of the optic nerve, capable of being stimulated by luminous objects, and of sending through the optic nerve such impressions as to produce in the brain visual sensations. 3, An apparatus for focusing objects at different distances from the eye (accommodation). 4, System of muscles by which the

eye is turned. Defects in the optical apparatus cause *Myopia* (short-sightedness); *Hypermetropia* (long-sightedness); *Astigmatism* (greater curvature of the eye in one meridian than in others); Spherical Aberration; Chromatic Aberration, etc. R. W. WEBSTER.

Piacenza (pyȧ-chen'tsȧ), a town of North Italy, capital of province of same name, nearly equidistant from Parma and Milan at the confluence of the Trebbia with the Po. Piacenza is an important railway center. The manufactures consist of cotton goods, woolens, stockings, hats, leather, etc., and there are also several silk-spinning and paper mills. Piacenza was originally a Roman colony and was founded in 219 B. C. Pop. 34,987. The province belongs to the basin of the Po, and is generally fertile; area 965 sq. mi.; pop. 226,717.

Pianoforte (or Piano), a musical stringed instrument, the strings of which are extended over bridges rising on the sounding board, and are made to vibrate by means of small felted *hammers*, which are put in motion by *keys*, and where a continual sound is not intended to be produced have their sound deadened immediately after the touch of the keys by means of leathern *dampers*. Its name is compounded of two Italian words signifying soft and strong, and it was so called in contradistinction to the harpsichord, the instrument which it superseded, and which did not permit of the strength of the notes being increased and diminished at will. The mechanism by which the movement of the keys is conveyed to the strings is called the *action*, and there is no part of the pianoforte in which the variations are more numerous. There are usually three strings in the pianoforte for each note in the higher and middle octaves, two in the lower, and one in the lowest notes. The strings are of steel wire. The lowest notes have their strings wound round with a double coil of brass wire, and those next above with a single coil. Pianofortes are either in the form of the grand piano, in which the strings lie in the direction of the keys, or they have the strings stretched vertically perpendicular to the keys, which is now the most common form, and constitutes the upright piano. Recently a variety called the upright grand has also been introduced. Grand pianos are used as concert instruments, and have the greatest compass and strength. The common compass of the piano at present is six and seven eighths or seven octaves. The invention of the pianoforte can scarcely be ascribed to any one man in particular. The first satisfactory hammer action appears to have been invented by an Italian of Padua, named Bartolommeo Cristofali, about 1711. The instrument was not introduced into England till the latter half of the eighteenth century. Among the principal improvers of the pianoforte are Sebastian Erard, the founder of the celebrated firm still in existence; Roller et Blanchet, the French firm which introduced the upright piano; Broadwood, Collard, Hopkinson, Kirkman, Bechstein, Steinway, besides others.

Piaz'za (Italian), in architecture, is a square or other open space surrounded by buildings. The term is frequently, but improperly, used to signify an arcaded or colonnaded walk.

Pichegru (pēsh-grü), CHARLES (1761–1804), French general, b. at Arbois, department of Jura. He was for some time a tutor at the College of Brienne, but soon exchanged this profession for that of a soldier. After the outbreak of the French Revolution he rose rapidly; was commander in chief of the army of the Rhine in 1793; and of the army of the north in 1794; subjugated Holland, and entered Amsterdam in January, 1795. Pichegru was now at the height of his fame, and was honored by the Convention with the title of savior of his country. But afterward he was transported to Cayenne. The year following he escaped to England, where he entered into a conspiracy with George Cadoudal to assassinate Napoleon. Having gone to Paris for that purpose, he was captured by the police, and committed to the Temple prison, where he was found strangled.

Pickles, vegetables and certain fruits first steeped in strong brine, and then preserved in close vessels. Wood vinegar is often used, but malt or wine vinegar produces the best pickles. Owing to the corroding effects of brine and vinegar the use of metallic vessels should be avoided in making pickles. To give a green color to pickles verdigris or other poisonous compounds of copper is sometimes employed by manufacturers.

Picts, the name given to the ancient Caledonians, who inhabited North Britain till the beginning of the sixth century, usually regarded as a Celtic race, though some consider them to have been not even Aryans, but Turanians.

Piedecuesta (pi-ā-de-kụ-es'tȧ), a town of the republic of Colombia, on the Rio de Oro, with a university. Pop. 9,015.

Piedmont, a department or territorial division of Italy, between Switzerland, Lombardy, Liguria, and France; area 11,198 sq. mi.; pop. 3,233,431. It forms the upper valley of the river Po, and derives its name, signifying "foot of the mountain," from its situation at the base of the loftiest ranges of the Alps, by which it is enclosed on all sides except toward the Lombard plain. It forms one of the most beautiful and fertile portions of Europe, commencing on the north, south, and west in majestic mountains, and thence descending in magnificent terraces and finally undulating slopes to the rich plains of the Po, to the basin of which it all belongs. It is divided into four provinces—Turin, Alessandria, Cuneo, and Novara. The chief town is Turin.

Pier, in architecture, is the name applied to a mass of masonry between openings in a wall, such as doors, windows, etc. The solid support from which an arch springs or which sustains a tower is also called a pier. The term is also applied to a mole or jetty carried out into the sea, intended to serve as an embankment to protect vessels from the open sea, and to form a harbor.

Pierce, FRANKLIN fourteenth president of

the United States; born at Hillsborough, N. H., Nov. 23, 1804; educated at Bowdoin College, where he was an associate of Nathaniel Hawthorne, who became his lifelong friend. Pierce was admitted to the bar in 1827 and began practice in his native town. He represented his town in the legislature, 1827–33; was representative in congress, 1833–37; and United States senator, 1837–42. He was an ardent advocate of the annexation of Texas, and declined a position in Polk's cabinet to take part in the Mexican War, where he rose to the rank of brigadier-general. He was president of the New Hampshire constitutional convention, 1850–51. It is conceded that his war record led to his nomination and election to the presidency in 1852. At this election Pierce received 254 electoral votes to 42 for Gen. Winfield Scott, the Whig candidate. Pierce's administration was a period of political turmoil. The agitation of the slavery question which culminated in the succeeding administration led to bitter feeling in congress and in the slave and free states. During the administration, the Missouri Compromise was repealed, the Kansas-Nebraska Bill was passed and the boundary between the United States and Texas settled by the Gadsden Purchase. The important events with foreign nations were Perry's treaty with Japan and the Walker filibustering expedition to Nicaragua. Mr. Pierce died Oct. 8, 1869. He was an ardent advocate of the State rights doctrine, and during the war of 1861–65, sympathized with the Southern states.

Pierre (pi-ār), St., a small island near the southern coast of Newfoundland, forming with the adjacent island of Miquelon a colony of France. The inhabitants subsist entirely by the cod fisheries and the industries connected with them. The islands of St. Pierre and Miquelon were first acquired by the French in 1763; and were finally confirmed to them at the general Peace of 1814. Area 90 sq. mi.; pop. 6,300.

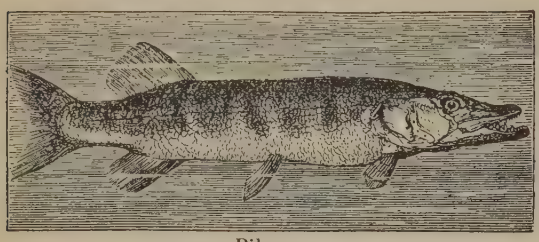
Piezom'eter, an instrument for measuring the compression of water and other liquids under pressure. In Oersted's piezometer the pressure is gauged by the manometer, and the amount of compression indicated by mercury in a glass tube.

Pigeon, the common name of a group of birds, forming in some systems a section of the order of rasorial or gallinaceous birds, in others a distinct order. The pigeons or doves as a group have the upper mandible arched toward its apex, and of horny consistence; a second curve exists at its base, where there is a cartilaginous plate or piece through which the nostrils pass. The crop is of large size. The pigeons are generally strong on the wing, they are mostly arboreal in habits, perching upon trees, and building their nests in elevated situations. Both sexes incubate; and these birds generally pair for life; the loss or death of a mate being in many cases apparently mourned and grieved over, and the survivor frequently refusing to be consoled by another mate. The song consists of the well-known plaintive *cooing*. The pigeons are distributed in every quarter of the globe, but attain the greatest luxuriance of plumage in warm and tropical regions. The pigeon family is divided into various groups. The true pigeons or Columbidæ are represented by the stock dove, the common wild pigeon, from which, it was once supposed, most of the beautiful varieties of the *Columbidæ*, which in a state of domestication are dependent upon man, derived their origin; but it is now believed the rock dove is the parent stock. The passenger pigeon is very abundant in North America. The numbers that sometimes move together are vast beyond conception. Millions of these pigeons associate together in a single roost. The house pigeons, tumblers, fantails, pouters, carriers, and jacobins are the chief varieties of the rock pigeon, and have been employed by Darwin to illustrate many of the points involved in his theory of "descent by natural selection."

Pigments, materials used for imparting color, especially in painting, but also in dyeing or otherwise. The coloring substances used as paints are partly artificial and partly natural productions. They are derived principally from the mineral kingdom; and even when animal or vegetable substances are used for coloring they are nearly always united with a mineral substance. In painting the colors are ground, and applied by means of some liquid, which dries up without changing them. The difference of the vehicle used with the method of employing it has given rise to the modes of painting in water colors, oil colors, in fresco, in distemper, etc. For oil painting mineral substances are more suitable than *lakes* prepared with minerals, because the latter become darker by being mixed with oil. The *lake* colors have tin or alum for their basis, and owe their tint to animal or vegetable coloring substances. Indigo is a purely vegetable color, as is also blue black, which is obtained from burned vine twigs. Ivory black is a purely animal color, being nothing else than burned ivory. In staining porcelain and glass the metallic colors which are not driven off by heat and are not easily changeable are used.

Pike, a genus of fishes belonging to the order Teleostei, and included in the Malacopterous division of the order. The pikes form the types of the family Esocidæ, in which group the body is lengthened, flattened on the back, and tapering abruptly toward the tail. One dorsal fin exists, this structure being placed far back on the body, and opposite the anal fin. The lower jaw projects. Teeth are present in plentiful array, and are borne by almost every bone entering into the composition of the mouth. The common pike occurs in the rivers of Europe and North America. It is fished chiefly for the sake of its flesh, which is accounted exceedingly wholesome. The pikes are very long-lived, and form the tyrants of their sphere, being the most voracious of freshwater fishes. When fully grown the pike may attain a length of 5 or 6 ft., and there are numerous instances on record in which these

fishes have greatly exceeded that length. The sea pikes, also known as gar pikes, are also included in the family Esocidæ. The saury pike resembles the gar pike in general conformation, but possesses the dorsal and anal fins in



Pike.

the shape of a number of divided "finlets." The bony pike of North American lakes and rivers belongs to an entirely different order of fishes—that of the Ganoidei.

Pike Perch, a genus of fishes closely allied to the perch, but showing a resemblance to the pike in its elongated body and head. Like the pike, it is a dangerous enemy to other freshwater fishes, but the flavor of its flesh is excellent. In Europe it occurs in two species. It also occurs in the fresh waters of the Great Lakes, the Upper Mississippi, and the Ohio.

Pike's Peak, one of the highest summits of the Rocky Mountains (14,134 ft.), in the center of the state of Colorado. It was discovered by General Pike in 1806. It abounds in rich gold-bearing quartz, and has a meteorological observatory. A rack-rail line of railway, 9 mi. long, to the top of the mountain has been completed.

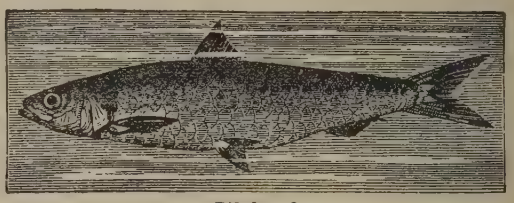
Pilaster.

Pilas'ter, a square pillar projecting from a pier or a wall to the extent of from one fourth to one third of its breadth. Pilasters originated in Grecian architecture. In Roman they were sometimes tapered like columns and finished with capitals modeled after the order with which they were used. See *Column.*

Pilate, Pontius, the sixth Roman procurator of Judea. He succeeded Valerius Gratus in A.D. 26. Nothing is known of his early history. He was a narrow-minded and impolitic governor, and at the very beginning of his term of office led to commotions among the Jews at Jerusalem. When Christ had been condemned to death by the Jewish priests, who had no power of inflicting capital punishments, he was carried by them to Pilate to be executed. Yielding to the clamors of the Jews the Roman governor ordered Jesus to be executed, but permitted Joseph of Arimathea to take his body and bury it. Pilate was afterward removed from his office by Vitellius, prefect of Syria (A.D. 36), and, according to tradition, was banished by Caligula to Vienna (Vienne), in Gaul, where he is said to have died or committed suicide some years after.

Pila'tus, Mount, a mountain in Switzerland, on the borders of the cantons of Lucerne and Unterwalden. Its loftiest peak, the Tomlishorn, attains a height of 7,116 ft. A railway to the summit was opened in 1889.

Pil'chard, a species of fishes included in the family and genus of the herrings (Clupeidæ), which they much resemble, though rather smaller. They frequent the coasts of Britain all the year round. The usual spawning time is October. They are found in greatest plenty on the southern coasts of England, the Cornwall pilchard fisheries being those best known and most celebrated. Pilchards are chiefly consumed in Spain, Italy, and France during Lent and other fasting seasons. Many



Pilchard.

of the commercial "sardines" are in reality young pilchards, the sardine (which see) being also included in the herring genus.

Pilcoma'yo, a river in South America, which rises in Bolivia, on the eastern declivities of the Andes, and falls into the Paraguay, near Asuncion, after forming the boundary between Paraguay and the Argentine Republic. Its entire length is between 1,500 and 1,600 mi. On account of its shallowness during the dry season and the great current in its narrow parts it does not appear likely to become usefully navigable.

Piles, in works of engineering, are used either for temporary purposes or to form a basis for permanent structures. In the former case they are usually squared logs of wood sharpened at the point, which is sometimes protected with an iron shoe to enable it to penetrate the harder strata which it may meet with in being driven into the ground. The most usual purpose to which piles are applied in temporary structures is to make coffer-dams. The permanent purposes for which piles are employed are various. In many cases the object is to secure a firm foundation in a loose or swampy soil. In these cases the piles used are now often of cast iron, sometimes solid and sometimes hollow. Piles are driven in by a heavy block raised and let fall alternately, this in extensive works being accomplished by means of steam machinery.

Pilgrim Fathers, the name given to the English, Scotch, and Dutch Nonconformists who, sailing from Southampton in the *Mayflower,* landed at what is now Plymouth, Mass., December, 1620, and colonized New England.

Pilibhit, a town in India, in the district of Bareilly, in the Northwest Provinces, 30 mi. n.e. of Bareilly city, on the Desha River, the entrepôt for an extensive traffic between the upper and lower country. The most important

industry is sugar refining. In 1740 it was seized by the Rohilla leader, Háfiz Rahmat Khán, who made it his capital. In the western outskirts stand his cathedral mosque and the remains of his palace. Pop. 29,721.

Pil'lory, a frame of wood erected on posts, with movable boards, and holes through which were put the heads and hands of a criminal for punishment. In this manner persons were formerly exposed to public view, and generally to public insult. It was a common punishment in this country during the early days.

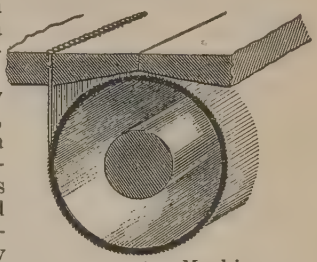
Pilot, a person qualified to navigate a vessel within a particular district. Laws regulating pilotage have been enacted, this power being controlled by Congress. The pilot laws of the states are different, some being unjust and burdensome, especially as to sailing vessels; while others are fair and equitable. A sailing or steam vessel engaged in foreign trade must pay for a pilot even when one is not employed. The compulsory pilotage system is being abolished in many large foreign seaports, without detriment to the general safety of navigation.

Pilot Fish, a genus of Teleostean fishes included in the Scomberidæ or mackerel family, and sometimes included in the same genus (*Scomber*) as the mackerel itself. The pilot fish was formerly supposed to act as a pilot to the mariner, and is still supposed to act as such to sharks. It often follows in the wake of ships for long distances, associating with sharks and devouring the refuse thrown overboard. The average length is about 12 in. In general form it resembles the mackerel.

Pillsbury, JOHN S. (1828–1901), ex-Governor of Minnesota; b. at Sutton, N. H., July 29, 1828. When twenty-seven years of age he removed to Minnesota, and engaged in the hardware business at St. Anthony, now Minneapolis. He afterwards became interested in the lumber trade, and later with his brother, Charles A., founded the largest flour producing establishment in the world. He was governor of Minnesota from 1876 to 1882, and a member of the Board of Regents of the state university for forty years. He gave Science Hall, costing $150,000, to the University of Minnesota.

Pilsen, a town in Western Bohemia, at the confluence of the Mies and Radbusa, 53 mi. s.w. of Prague. It consists of the town proper, with promenades on the site of the old ramparts, and of three suburbs. The principal buildings are the church (1292), townhouse, real school, and theaters. The chief article of manufacture and commerce is beer. Coal, iron, alum, etc., are worked in the neighborhood. The second town of Bohemia, Pilsen, dates from 1272. During the Thirty Years' War it was for a time the headquarters of Wallenstein. Pop. 46,817.

Pin, a piece of wire, generally brass, sharp at one end and with a head at the other, chiefly used by women in adjusting their dress. By the old methods of manufacture by hand, the distinct processes, from the straightening of the wire to the spinning and hammering of the head, were usually said to be fourteen. Among the most important improvements in the fabrication of pins are the machines by which the head is formed from the pin itself, and the machine for sticking the pins in paper—both American inventions. Solid-headed pins, now universally used, were first made in 1824. The consumption of pins in the United States is estimated at thirty millions a day.



Pin-pointing Machine.

Pin Making.—Pins are made of an alloy of copper and zinc, two parts of the first to one part of the second. The metal is first cast in ingots in an iron mold about six feet long, three inches wide, and half an inch thick. These bars are rolled into sheets about one eighth of an inch thick. The pressure of the rolls makes the metal inflexible and somewhat brittle, and the bars are annealed or softened by heat and slow cooling several times while being reduced from ingots to sheets. When the sheets have reached the required thinness, they are passed through slitting rolls which slice up the sheets into rods one eighth of an inch square and these rods are drawn into wire. One end of the rod is pointed so that it will pass through a round hole in the steel draw plate. A pair of powerful nippers grasps the pointed end of the rod, and as the nippers are on a revolving reel, the rod is drawn through the hole and comes out on the other side a round wire, smaller in diameter than the square rod was. The reel of wire is annealed, and then drawn through another and smaller hole, and this process is continued, the wire being annealed each time until the size required for the pin is reached. The metal, though somewhat stiff, is too soft to spring out straight, and as the drawing reels are of a smaller diameter, the wire is kinky and must be straightened before it is ready for the pin-making machine. After the kinks have been taken out, the wire is wound on a large reel which is hung over the pin-making machine. In this machine the pin is cut from the wire, headed, pointed, sharpened, and polished. This machine is a combination of steel fingers, rollers, cams, toggle joints, headers, revolving files, and belts. The wire caught by a pair of rollers, is drawn forward into the machine, where it is cut into just the right length; two raps from a cam and toggle form the head. A steel finger puts the headed wire on a wheel under the heading dies, and the pointless pin is carried down between two revolving steel disks. One of them revolves faster than the other, so the pin is turned round as it travels forward. Just at this point it comes in contact with four revolving files which point the pin, and then an emery belt puts the first polish on it. The pins drop from the machine at the rate of 160 a minute and fall into a hopper, from which they are taken to the tinning room. In passing from the pin machine the

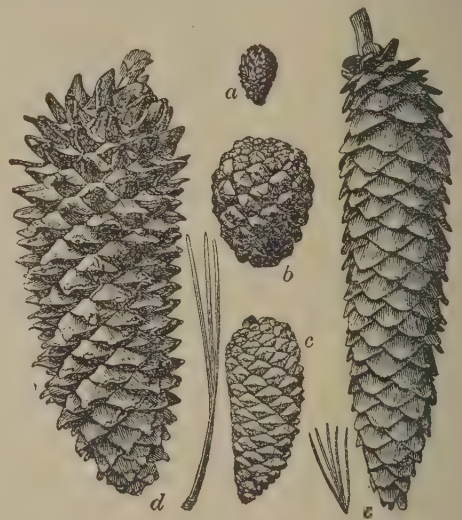
pins become covered with oil and dirt, and this is removed by putting them into a revolving iron barrel with sawdust. The tinning process consists in the pins being boiled for four hours in a preparation of pure tin. They are then washed with strong soapsuds to give them a smooth surface. After being rolled through the sawdust again they are ready to be stuck into papers.

The sticking machine crimps the paper and sticks the pins in at the same time. The pins are put in a hopper which feeds the sticking machine. An inclined steel plate, furrowed with little runs or channels, leads from the hopper to the machine. The pins are caught by revolving steel fingers and pushed forward upon the inclined plate into the runs. The runs converge to a plate which moves slightly back and forth across the rows of slots. This cutting off plate catches the pins, and when the holes are full a number of little rams or hammers shove the pins into the crimp of the paper which is formed a second before the pins are stuck in. Black or mourning pins are made from iron wire and japanned.

Pinckney, CHARLES COTESWORTH (1746–1825), statesman, was b. in Charleston, S. C. In the Revolutionary War he displayed resolution and intrepidity, and for two years suffered rigorous confinement. In 1787 was member of the convention that framed the Constitution. As minister to France in 1796 he had occasion to make the declaration, "Millions for defense, but not one cent for tribute." "His love of honor was greater than his love of power, and deeper than his love of self."

Pindar (PIN'DAROS) (522–442), the greatest of the lyric poets of Greece, b. in Bœotia, in or near Thebes, of a noble family. At an early age he was instructed in music and poetry; and for the development of his poetical talent he was sent to Athens, where he became the pupil of Lasus of Hermione, the founder of the Athenian school of dithyrambic poetry. In after life he showed himself a great admirer of Athens and the Athenians, who rewarded him for the honors he paid to them by making him a public guest of the city and giving him a present of 10,000 drachmas, and after his death erected a statue in his honor. He was held in great honor by many princes of Greek states, for whom he composed choral songs, and had close relations with Delphi. He practised all kinds of lyric poetry, and excelled equally in all.

Pine, the popular name of trees of the genus *Pinus*, which is divided into two sub-orders, namely, 1, the fir tribe; and 2, the cypress tribe. The pines belong to the former section, and are distinguished from the spruce, larch, fir, cedar, etc., chiefly by having persistent leaves in clusters of two to five in the axils of membranous scales. All the European species, except one, have only two leaves in a sheath; most of the Asiatic, Mexican, and Californian kinds have three, four, or five leaves, and those of the U. S. and Canada have generally three. The cones also afford an important ready means of distinction and classification. The Scotch pine or fir is a tall, straight, hardy tree, from 60 to 100 ft. high; a native of most parts of Europe, flowering in May and June, and having many varieties. The leaves are rigid, in pairs, somewhat waved and twisted; the lower branches are somewhat pendant; the bark is of a reddish tinge, sometimes rough and furrowed. The leaves are distinguishable from those of all other pines in which they



Cones of (*a*) *Pinus montana;* (*b*) *P. pinea;* and (*c*) *P. Pinaster*. Cones and needles of (*d*) *P. coulteri;* and (*e*) *P. Lambertiana*. All about ¼ natural size.

occur in pairs by their glaucous hue, especially when young. The Scotch pine almost always occurs in masses; it is considered full grown and fit to be cut down for timber in fifty or sixty years; but in the north of Scotland, where pine forests grew to perfection in former times, the tree continued to increase in bulk for three or four centuries. The tree is most abundant in the north of Europe, between lat. 52° and 65°. There are extensive forests of it in Russia, Poland, Sweden, Norway, Germany, the Alps, the Pyrenees, and the Vosges. The Corsican pine grows to a height of from 80 to 100 ft., and in the island of Corsica it is said to reach an altitude of 140 to 150 ft. The pinaster, or cluster pine, is indigenous to the south of Europe, to the west of Asia, the Himalayas, and it seems, even to China. It is a large, handsome, pyramidal tree, varying from 40 to 60 ft. in height. Its cones point upward, in star-like clusters, whence the name of pinaster or star pine. In France, especially between Bayonne and Bordeaux, it covers immense tracts of barren sand, in which it has been planted to prevent the sand from drifting. The stone pine is a lofty tree in the south of Europe, where it is a native; its spreading head forms a kind of parasol; the trunk is 50 or 60 ft. high, and clear of branches. In Britain the stone pine seldom exceeds the size of a large bush, although specimens have reached a height of 30 and 40 ft. Sabine's pine was discovered in California in 1826. The leaves are in threes, rarely in

fours, from 11 to 14 in. long; the trees are of a tapering form, straight, and from 40 to 120 ft. high, with trunks from 3 to 12 ft. in diameter. The Cembran pine is a native of Switzerland and Siberia. The red Canadian pine, or yellow pine, inhabits the whole of Canada from the Atlantic to the Pacific, and is also found in the northern and eastern parts of the U. S. The trunk rises to the height of 70 or 80 ft. by about 2 in diameter at the base, and is chiefly remarkable for its uniform size for two thirds of its length. The wood is yellowish, compact, fine grained, resinous, and durable. The true yellow pine rises to the height of 50 or 60 ft., by 15 or 18 in. in diameter at base. The cones are small, oval, and armed with fine spines. The timber is largely used in shipbuilding and for house timber. The Labrador or Bank's pine is usually a low straggling tree, growing among barren rocks to a height of from 5 to 8 ft., but may attain three times that height. The cones are recurved and twisted; and the leaves are regularly distributed over the branches. In Nova Scotia and the state of Maine it is known as the scrub pine, and in Canada as the gray pine. The other American pines are the Jersey pine, the trunk of which is too small to be of any utility in the arts; the pitch pine, which is most abundant along the Atlantic coast, and the wood of which, when the tree grows in a dry, gravelly soil, is compact, heavy, and contains a large proportion of resin; the loblolly pine, the timber of which decays speedily on being exposed to the air; the long-leaved pine, which abounds in the lower part of the Carolinas, Georgia, and Florida, furnishing resin, tar, pitch, and turpentine, and timber which is hardly inferior to the white oak in naval architecture; the Weymouth pine, the timber of which, though not without essential defects, is consumed in much greater quantities, and for a far greater variety of purposes, than almost any other; and Lambert's pine, which grows between the fortieth and forty-third parallels of latitude, and about 100 mi. from the Pacific. It is of gigantic size, the trunk rising from 150 to upward of 200 ft., and being from 7 to nearly 20 ft. in diameter.

Pineapple, a tropical fruit which takes its name from its outward resemblance to a pine cone. The botanical name is *ananassa sativa*, and it belongs to the plant order *Bromeliacæ*. The pineapple is a biennial. It has long pointed leaves, whose edges are in most species furnished with sharp spines. The leaves are thick and juicy. From the center of the cluster a stem rises two or three feet and bears on its upper end a flower cluster in the form of a conical spike. Each flower is placed in the axil of a bract, except those near the top, which develop into a cluster of small leaves which crowns the ripened fruit. The fruit is the thickened fleshy flower stalk, and in this respect, as well as in its odor and flavor, the pineapple somewhat resembles the strawberry. The pineapple is a native of South America and the West Indies, where the early Spanish explorers discovered it to be cultivated by the Indians. It is highly prized and has been carried to the warm countries of Europe and Asia. In England it is raised in hot houses. Its successful culture requires a warm climate and abundant moisture. The fruit varies in size from two to twelve pounds. About fifty species are known. The fibre of the leaves is often woven into delicate and beautiful fabrics. That of the Philippines is called Pina muslin.

Pine Bluff, Jefferson co., Ark., on Arkansas River. Railroads: St. Louis Southwestern; St. L. I. M. & S.; P. B. & S. L.; and L. R. & P. B. Industries: two iron foundries, meal mill, farm implements and several other factories. Surrounding country agricultural. The town was first settled in 1840, and became a city in 1878. Pop. 1900, 11,496.

Pingree, Hazen S. (1840–1901), ex-Governor of Michigan; b. at Denmark, Maine, Aug. 30, 1840. He learned the trade of a shoe cutter, but entered the Union army in 1861 and served during the war. He subsequently located in Detroit, and in 1866, with C. H. Smith, started a small shoe factory. This has become one of the largest manufacturing establishments in the West. He was mayor of Detroit from 1889 to 1896, and governor of Michigan from 1896 to 1900. He died in London, Eng., June 18, 1901. Mr. Pingree was the leader in a number of municipal reforms in Detroit, and was a strong advocate of municipal ownership of street railways. While governor he attempted to reform the methods of taxation.

The Pineapple.

Pinkerton, A. G. (1819–1884), b. in Scotland. He came to Chicago in 1841, and was made deputy sheriff and a member of the detective department of Chicago police in 1850. He was head of the secret police of the Union army during the Civil War. Among the books which he has published are *Criminal Reminiscences and Detective Sketches*, *The Gypsies and the Detectives*, *The Burglar's Fate*, *The Spy of the Rebellion*, and *Thirty Years a Detective*. The organization of the Pinkerton detectives which he effected is still in existence.

Pintail Duck, a genus of ducks, so called from the elongated form of the tail-feathers. In size the common pintail duck is equal to

the mallard. They are common in the Mississippi Valley, and occur on the Mediterranean coasts, in the Gulf of Mexico, in the West Indian Islands, and in Africa. They breed in confinement, and the flesh is savory.

Pinto, Major Serpa, Portuguese traveler, b. in 1846, and educated at the Royal Military College, Lisbon; entered the Portuguese army in 1863. In 1877–79 he crossed Africa from Benguela to Durban, and described his journey in a work entitled *How I Crossed Africa*, which procured him many honors, especially from geographical societies. He has led several exploring expeditions, and his proceedings in the Zambezi district led in 1890 to a vigorous and successful protest by Britain against the claims of Portugal in that quarter.

Pinturicchio (pin-tu-rik'yō), an eminent Italian painter of the Umbrian school, whose real name was Bernardino di Betto, was b. at Perugia. He lived for a time at Rome, and while there was engaged on the frescoes of the Sistine Chapel, being at this time under the influence of Perugino. His chief work was a series of mural paintings illustrating the life of Pope Pius II, in the cathedral library at Siena. There are also fine frescoes by him in the Buffalini Chapel in the church St. Maria in Araceli, Rome. He left many exquisite altar-pieces and other works in tempera; he never painted in oil.

Piombo, Sebastiano Luciani del (1485–1547), a celebrated painter b. at Venice. He studied under Giovanni Bellini and Gorgione, whose fine coloring he imitated. Coming to Rome about 1512, he was induced by Michael Angelo to enter into rivalry with Raphael. When Raphael painted his celebrated *Transfiguration*, Sebastiano attempted to surpass it by painting the *Raising of Lazarus*, which is considered his greatest work, and is now in the National Gallery, London. His chief merit, however, lay in his single figures and portraits, such as his *Clement VII.*

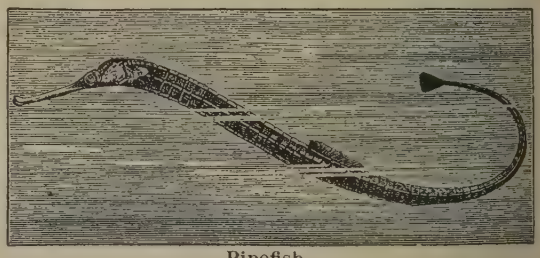
Piotrkov, a town of Russian Poland in the government of same name, one of the oldest towns of Poland. It was at one time the seat of the Polish diet, and the kings were elected here. Pop. 24,866. The government has an area of 4,729 sq. mi. It is moderately fertile, and has considerable manufactures of cottons and woolens. Pop. 1,061,101.

Pipe, a wine measure usually containing very nearly 105 imperial or 126 wine gallons. Two pipes or 210 imperial gallons make a tun. In practise, however, the size of the pipe varies according to the kind of wine it contains. Thus a pipe of port contains (about) 138 wine gallons: of sherry 130; of Madeira 110; etc.

Pipe, a tube for the conveyance of water, steam, gas, or other fluid, used for a great variety of purposes in the arts and in domestic economy. The materials of which pipes are made are also very various, wood, stone, earthenware, iron, lead, copper, leather, guttapercha, etc., all being employed. Drainage and sewage pipes of great strength and size (measuring from 1 or 2 up to 54 in. in diameter) are now usually made of fire clay, glazed on their outer and inner surfaces. Large iron pipes are usually cast, and are used for the supply of water and gas.

Pipe, Tobacco, a bowl and connecting tube, made of baked clay, wood, stone, or other material, and used in smoking tobacco. The chief processes in the manufacture of clay pipes are molding and baking. Finer and more expensive pipes are made of meerschaum, a somewhat plastic magnesian stone of a soft greasy feel. Meerschaum pipe making is carried on to the greatest extent by the Germans, and Vienna may be said to be the center of the manufacture. Sometimes the bowl alone (which is frequently artistically carved) is of meerschaum, the stem being of wood, the best sorts of which are got from the young stems of the Mahaleb cherry, grown near Vienna, the mock orange of Hungary, and the jessamine sticks of Turkey. The stem, whether of the same material as the bowl or of wood, is usually provided with a mouthpiece of ivory, silver, or amber, the last being preferred. Brier-root pipes, with the bowl and stem of one piece of wood, and provided with amber, ivory, or bone mouthpieces, are now very common. They are made of the roots of a large variety of heath. Many Germans prefer pipes with porcelain bowls, which are sometimes beautifully painted in the style of fine chinaware painting. The Eastern hookah is a pipe of great size, the bowl of which is set upon an air-tight vessel partially filled with water, and has a small tube which passes down into the water; the long flexible smoking-tube is inserted in the side of the vessel, and the smoke is made to pass through the water, being thus cooled and deprived of some noxious properties. In this country pipes have been in use from a very remote period. Indian pipes, with elaborately carved soapstone bowls and ornamented wooden stems, or entirely of baked clay, have been found in the ancient mounds of the West, together with other relics of an unknown race.

Pipefishes (*Syngnathus*), a genus of fishes included in the sub-order Lophobranchii and nearly allied to the curious little fishes popularly known as "sea-horses." See *Hippocampus*. They are distinguished by a long and tapering body, and by jaws united to form a tube or pipe, bearing the mouth at the tip. The *Syngnathus acus* is one of the most familiar species. It averages 20 in. in length. The largest of the pipefishes is said to attain a



Pipefish.

length of 3 ft. A very remarkable circumstance in connection with the pipefishes consists in the males of some species possessing a pouch-like fold, situated at the base of the tail, in which the eggs are contained after being extruded from the body of the females, and in which the young, after hatching, continue to reside for a time. The name pipefish is also applied to the members of the genus *Fistularia*, included in the Acanthopterous division of the Teleostei. The bones of the face are prolonged to form a tubular structure, at the extremity of which the mouth opens. The *Fistularia tapacaria* of the Antilles represents this genus.

Pipit (or Titlark), a genus of perching birds possessing striking affinities with the larks,

Meadow Pipit.

which they resemble in the large size of the hinder claw, but commonly classed with the wagtails, which they closely resemble in their habits of running swiftly on the ground. All the pipits build their nests on the ground. The song in all consists of a clear, simple note.

Pippin, the name given to a certain class of dessert apples, probably because the trees were raised from the pips or seeds, and bore the apples which gave them celebrity without grafting. The Ribston, Golden, and Newton Pippin are favorite varieties in the U. S.

Piqua, city of Miami co., O., 73 m. w. by n. of Columbus; on the Miami river and the Miami & Erie Canal; and on the Cinn., Ham. & Dayton, the Miami Valley and the Pitts., Cinn., Chi. & St. L. railroads. Piqua is a trade center and great shipping point in a rich farming region. It is the second linseed oil center in the United States. Other industries are strawboard mills, bent-wood works, rolling mills, tin-plate works, corrugated iron works and furniture factories. Pop. 1900, 12,172.

Pi'racy consists in committing those acts of robbery and depredation upon the high seas, or other places where the admiralty has jurisdiction, which, if committed upon land, would have amounted to felony only. This is substantially the definition of this offense by the law of nations, which, on conviction, is punished with death in the U. S. It is an offense against the universal law of society. Piracy, in the common sense of the word, is distinguished from privateering by the circumstance that the pirate sails without any commission, and under no national flag, and attacks the subjects of all nations alike; the privateer acts under a commission from a belligerent power, which authorizes him to attack, plunder, and destroy the vessels which he may encounter belonging to the hostile state.

Piræus, the principal port of both ancient and modern Athens, is situated about 5 mi. from that city, on a peninsula. It has three harbors; two on the east side, anciently named Zea and Munychia, and one on the west side, called simply Piræus, or the Harbor, the largest of the three. The Piræus was anciently connected with Athens by walls known as the Long Walls. When Greece was liberated from Turkish rule the Piræus was merely a scene of ruins. Since then a flourishing industrial and trading town has grown up, which is connected with Athens by a railway. Pop. 34,327.

Pisa, a town of Northern Italy, capital of the province of the same name, 6 mi. from the Mediterranean, and 44 mi. w. of Florence, on both banks of the Arno, here crossed by three stone bridges for general traffic, and one carrying the railway. It is surrounded by walls and ditches, and defended by a citadel, the fortified circuit having a length of nearly 6 mi., much of the space enclosed being unoccupied. The river is lined by handsome quays on both sides; the streets are spacious and well paved; and the houses are remarkable for the profusion with which marble has been employed in their construction. In the northwest part of the city is a remarkable group of buildings consisting of the Duomo or cathedral, the Baptistery, the famous "Leaning Tower," and the Campo Santo. The manufactures consist chiefly of silk, woolen, and cotton goods. The population, which reached 150,000 when the city was in its zenith, is now only 37,704. The province of Pisa has an area of 1,180 sq. mi., and a pop. of 283,269.

Pisa, Council of, a general council of the Roman Catholic Church held to consider the pretensions of the rival popes of Avignon and of Rome, opened March 25, 1409. The rival popes, Benedict XIII (of Avignon) and Gregory XII (of Rome) were summoned to appear within a stated period, but refused to comply. After mature deliberation both popes were formally deposed, and Cardinal Pietro Philargi, archbishop of Milan, was elected. The authority of the council was not, however, generally recognized, and it was not until 1417 that the schism can be said to have terminated.

Pisces (the Fishes), a sign of the zodiac, which is entered by the sun about February 19. The constellation which occupies the zodiacal region corresponding to the sign has the same name; it contains some interesting double stars

Pisciculture, the breeding, rearing, preservation, feeding, and fattening of fish by artificial means. Pisciculture has been practised from very remote ages, having been in use in ancient Egypt, and followed in China in early times on a very large scale. The art, so far as the perfecting of natural conditions under

which fish live and thrive, without interfering directly with the ordinary processes of nature, has thus always been more or less practised. But the discovery that the ova of fish can be taken from the body of the female parent, impregnated with the male milt and hatched in tanks, has led to a great extension of the art. One great point in modern pisciculture is the propagation and rearing of young fish in artificial ponds with the view of introducing fish into some locality where they were not previously found. Salmon and trout ova have been sent from Britain, and successfully propagated in Australia and New Zealand. The art has now come into general favor and is widely followed, very many rivers having on their banks breeding and rearing establishments for the purpose of increasing the stock of fish in the streams. In Scotland a very successful effort has been carried out at Stormont field, near Perth, on the Tay, and there is a still more famous piscicultural establishment belonging to Sir James Gibson Maitland at Howietoun, near Stirling. The Midlands Counties' fish culture establishment at Malvern Wells is the largest in England. From Huningue, near Basel, on the Rhine, millions of ova are annually despatched to England, Germany, Spain, and other countries. The American Fish and Fisheries Commission have successfully introduced into various waters the American whitefish, the Californian trout, the American brook char, etc., and pisciculture on a large scale is practised both in the U. S. and Canada. The artificial culture of oysters, mussels, lobsters, and other crustacea is also receiving attention, and altogether the art is every year attaining a greater development, and promises to become yet an important department of commercial industry.

Pisis'tratus, "tyrant" of Athens, was descended from Codrus, the last king of Athens, and was b. not later than 612 B. C. He was rich, handsome, and eloquent, and soon placed himself at the head of one of the three parties into which Attica was then divided. By putting himself forward as the patron and benefactor of the poor, and by advocating civil equality and a democratic constitution, he was able to seize upon the Acropolis in 560 B. C., and thus to make himself master, or, as the Greeks termed it, "tyrant" of the city. But though a tyrant in the Greek sense, his use of power was by no means tyrannical. He made no attempt to abolish the wise laws of Solon, but confirmed and extended their authority. He was, however, twice driven from Athens; but in the eleventh year of his second banishment succeeded in making himself master of the sovereignty for the third time. Pisistratus erected splendid public buildings at Athens, established a public library, and collected and arranged the poems of Homer, and conducted himself with so much prudence and clemency that his country scarcely ever enjoyed a longer term of peace and prosperity.

Pistil, in botany, the female or central seed-bearing organ of a phanerogamous flower, consisting of one or more *carpels* or modified leaves. There may be only a single pistil or several in the same flower. It consists essentially of two parts, the *ovary*, containing the ovules or young seeds, and the *stigma*, a cellular secreting body, which is either seated immediately on the ovary (as in the tulip and poppy), and is then called *sessile*, or is borne on a stalk called a *style* interposed between the ovary and stigma. It is on the stigma that the pollen falls by which fecundation takes place, after which the ovule develops into the seed.

Pistol, a small firearm with a curved stock, discharged with one hand, named from the town of Pistoja, where they were first made. Pistols were introduced into England in 1521. Mention is made of their use in 1544. The "dag" mentioned by the Elizabethan writers was a kind of clumsy pistol. Pistols are made of various sizes, ranging from 6 in. (the saloon and pocket pistol) to 18 and even 24 in. (the holster pistol).

Pitcairn Island, an island in the South Pacific, belonging to the Low Archipelago; length, 2¼ mi.; breadth, about 1 mi. It was discovered by Carteret in 1767. Its coast is almost perpendicular throughout its whole extent, fringed with formidable rocks and reefs, accessible only at two points, and not at all in stormy weather. It rises to the height of 1,100 ft., and the soil, naturally fertile, yields good pasture, potatoes, yams, plantain, and bread-fruit, pineapples, and other tropical fruits. The island is chiefly remarkable as the home of the descendants of the *Bounty* mutineers, nine of whom, together with six men and twelve women, natives of Tahiti, landed here in 1790. Violent dissensions soon arose, and at the end of ten years the only survivors were John Adams, an Englishman, the females, and nineteen children. They were found in 1808 by the American, Captain Folger, who reported the discovery to the British government. They were transferred to Norfolk Island in 1856, but about 40 soon returned. In 1881, the inhabitants numbered 96, and in 1884, 130.

Pitch, the residuum obtained by boiling tar till the volatile matter is driven off. See *Tar Making*.

Pitch Stone, a black, glossy, pitch-like volcanic rock, found in southern Europe and South America. See *Obsidian*.

Pitt, William (1759–1806), the second son of William Pitt, earl of Chatham, and of Lady Hester Grenville, daughter of Hester, Countess Temple, was b. on May 28, 1759. He was educated at Cambridge. He was called to the bar in 1780, and entered Parliament the following year as member for Appleby. He became chancellor of the exchequer at twenty-three, under the Earl of Shelbourne, and in the following year attained the position of prime minister. Later he was returned by the University of Cambridge. His first measure was the passing of his India bill, establishing the board of control, which was followed by much of that fiscal and financial regulation that gave so much *éclat* to the early period of his administration. The establishment of the delusive scheme of a sinking fund followed in 1786, and his Regency

bill in 1788. The French Revolution now broke out, and in 1793 war arose between Great Britain and France, a conflict which brought a heavy responsibility on Pitt, and immense sacrifices and burdens on his country. In 1800 the Irish union was accomplished. In 1801 the opposition of the king to all further concession to the Irish Catholics caused Pitt to resign his post. The Peace of Amiens succeeded; and the Addington administration, which concluded it, Pitt supported for a time, and then joined the Opposition. The new minister, who had renewed the war, unable to maintain his ground, resigned; and in 1804 Pitt resumed his post at the treasury. Returning to power as a war minister, he exerted all the energy of his character to render the contest successful, and found means to engage the two great military powers of Russia and Austria in a new coalition, which was dissolved by the battle of Austerlitz. This event he did not survive long. Biographers naturally differ as to his merits as a statesman; some assign him a most exalted place, while others represent him as entirely destitute of great ideas, as a man of expedients instead of principles, as a lover of place and royal favor.

Pit'tacus (652–569 B.C.), one of the so-called seven wise men of Greece. He was highly celebrated as a warrior, a statesman, a philosopher, and a poet. In 589 the citizens raised him to the dictatorship, an office which he filled for ten years.

Pittsburg, county seat of Allegheny co., Pa., 354 m. w. by n. of Philadelphia; on the delta between the Allegheny and Monongahela rivers, which here form the Ohio; and on eight main and several branch lines of railway. The principal railroads centering here are the Pennsylvania System, the Baltimore & Ohio and the Vanderbilt System. Navigation on the three rivers has been greatly facilitated by the construction of dams, chiefly movable. Nine bridges span the Allegheny and five the Monongahela, while several new ones are being projected. From its situation, Pittsburg enjoys excellent commercial facilities and is the center of an extensive commerce with the western states. Its nearness to the apparently inexhaustible iron, coal, petroleum and natural gas fields of Pennsylvania has made it a great manufacturing center. The extent of its iron manufactures has given it the name of the *Iron City*. It manufactures more than half of the Bessemer steel, rolled iron and steel rails and plates and sheets made in the United States, and is the leading plate-glass center of the world. Other important productions are aluminum, copper, refined petroleum, malt liquors, steam and electrical machinery, tobacco, leather, and cotton and woolen goods. Pittsburg was laid out in 1765 on the site of the old French Fort Duquesne. When the British captured the fort, they changed its name to Fort Pitt, in honor of William Pitt. It became a city under the name of Pittsburg, in 1816. Pittsburg is substantially and compactly built. The principal streets, Liberty, Wood, Market, Smithfield, Fifth Av., Pennsylvania and Sixth streets contain many handsome buildings. Among the public buildings are the Municipal Hall, United States Arsenal, Mercantile Library, Carnegie Institute, Duquesne Club, and Trinity Church. Tne Pittsburg Female College (Methodist Episcopal) and the Pennsylvania Female College (Presbyterian) are both flourishing institutions of learning. Among charitable institutions are the Western Pennsylvania Hospital, the Mercy Hospital, the Homeopathic Hospital, the Episcopal Church Home and the Roman Catholic Orphan Asylum. The Convent of the Sisters of Mercy is the oldest house of this order in America. Pittsburg is the second city of Pennsylvania in population and importance. Pop. 1900, 321,161.

Pittsfield, Berkshire co., Mass., on Housatonic River, 150 mi. w. of Boston. Railroads: Housatonic, and Boston & Albany. Industries include the manufacture of shoes, machinery, knit goods, cotton and woolen goods, etc. Pop. 1900, 21,766.

Pittsburg, Crawford co., Kans. Railroads: A. T. & S. F.; Missouri Pacific; St. L. & St. F.; K. C. F. S. & M. Industries: coal mining, zinc smelting (employing 1,200 men), brick works, etc. Pop. 1900, 10,112.

Pittston, Luzerne co., Pa., on Susquehanna River, 9 mi. n.e. of Wilkesbarre. Railroads: D. L. & W.; Lehigh Valley; Delaware & Hudson. Industries: mainly mining of anthracite coal. There are also planing, paper, and knitting mills, engine and terra-cotta works, and tanneries. Pop. 1900, 12,556.

Pius II, Aeneas Sylvius Piccolomini (1405-1464), was Pope from 1458 to 1464. He studied at Siena and subsequently became secretary to Cardinal Capronica. He was also secretary to Antipope Felix. Emperor Frederic III made him ambassador successively to the courts of Milan, Naples and Rome. Calixtus III raised him to the cardinalate. As Pope he founded a military order of knights to defend the isles of the Ægean Sea against the Turks. But Pius II was best known for his literary works. The most interesting of his writings are his letters.

Pius V (1504-1572), Pope from 1566 to 1572. His chief service as Pope was to enforce the reform decrees of the Council of Trent. With Spain and France he organized the Holy League against the Turks.

Pius VI (1717–1799) (Giovanni Angelo Braschi), pope. He held important offices under several pontiffs, was raised to the cardinalate by Clement XIV, and succeeded him in 1775. Several beneficent reforms were introduced by him in the finance department.

Pius VII (1741–1823) (Gregorio Barnaba Chiaramonti), pope. Pius VI created him bishop of Tivoli, cardinal and bishop of Imola; and his friendly attitude toward the Cisalpine republic secured him the favor of France, and the election to the papal chair in 1800. After his accession he aimed at re-establishing the old order of things, and to gain it he tried to conciliate Napoleon by attending his coronation. He aroused the open enmity of the em

peror by refusing to be present at the coronation in Milan; and to recognize his brother Joseph as king of Naples; the results being another occupation of Rome by French troops, the incorporation of the papal cities, and shortly after of Rome itself, with the kingdom of Italy, and the arrest of the pope and his confinement in Savona and afterward at Fontainebleau. In 1814 he was released and restored to the possession of all the papal territories except those of Avignon and Venaissin in France and a narrow strip of land beyond the Po.

Pius IX (1792–1878) (GIOVANNI MARIA MASTAI-FERETTI), pope. He held various ecclesiastical offices under Leo XII, who appointed him archbishop of Spoleto in 1827, and to the see of Imola in 1832. Although raised to the cardinalate in 1840 he resided in his diocese until his election to the pontificate in 1846. His accession was signalized by the release of 2,000 political prisoners, followed by a complete amnesty; and Italy was to be free and independent under a liberal constitution. A Roman republic was proclaimed (1849), with Mazzini at its head. Louis Napoleon, president of the French Republic, sent an expedition to Rome, which defeated the Italian patriots under Garibaldi, and occupied the city (July 3). The pope returned in April, 1850, but he left the direction of state affairs principally in the hands of his secretary of state, Cardinal Antonelli.

Pius X. SARTO, GUISEPPE (1835–——), pope; the successor of Leo XIII. Sarto was born at Riese, Italy, in the Venetian province of Treviso, on June 2, 1835. He was sent from the village school to the college at Castel Franco, whence he passed to the central seminary at Padua, where he graduated with much distinction and was ordained priest in the cathedral of Castel Franco on Sept. 18, 1858. His first curé was in the parish of Tombolo, from which in 1867 he was transferred to Salzano and was made parish priest. Eight years later, the Bishop of Treviso recognizing his piety and ability, appointed him not only canon of the cathedral of Treviso and chancellor of the diocese, but the spiritual director of the college. Ere long he was made dean of the chapter, and after serving during an interregnum as vicar-general was appointed suffragan by the new bishop. He next became Bishop of Mantua. In 1893, Leo XIII made him a cardinal and almost immediately afterward created him Patriarch of Venice. In 1894, there was considerable anti-clerical agitation going on in Venice. But the new bishop was not long in making himself beloved by all in his Patriarchate. He took a deep interest in social questions and threw himself heart and soul into all enterprises for the bettering of the lot of the poor, lending his aid to the institution of rural banks, co-operative societies and benevolent associations On August 4, 1903, he was elected pope and chose for himself the papal name of Pius X. He was crowned in St. Peter's Cathedral at Rome, Aug. 9. The new pope is known for his sincerity, his generosity and his sympathy with the people. In breadth of education he is one of the most respected members of the Sacred College. He lives simply, almost frugally, and his manner is characterized by a charming and genuine courtesy. Among the few books from his pen is a *Manual of Politeness*, which he wrote for the benefit of his clergy. He is an eloquent and convincing speaker, a skilled musician, and a connoisseur in art. As a worker he belongs to the strenuous type and is known among the clergy as a rigid disciplinarian. Although not a politician, according to the ordinary meaning of that word, he has good common sense and has on various occasions proved that he possesses executive ability in a marked degree. Yet the basis of the character of Pius X is a simple and earnest piety.

Pizar'ro, FRANCISCO (1471–1541), Spanish adventurer, the discoverer and conqueror of Peru, the illegitimate son of a hidalgo, and was first a swineherd and then a soldier. The spirit of adventure which at that time pervaded Spain, prompted him to seek fortune in the newly found continent of America, where he participated in various military and trading expeditions. While resident near Panama he became associated with two other adventurers, Hernando Lugue, or de Lugues, and Diego de Almagro. In 1524, they jointly fitted out an expedition with a view to exploration and conquest, and on their second voyage discovered Peru; but finding their force inadequate for conquering the country, Pizarro returned to Spain for assistance. He arrived in Seville in 1528, was granted the necessary powers and a small force, and re-crossed the Atlantic in 1531. The following year he arrived in Peru during a civil war, treacherously seized the person of the reigning inca at a friendly banquet, and after extorting an immense ransom, put him to death. The whole empire was gradually conquered without much opposition, but its settlement was long in abeyance owing to a feud between Pizarro and Almagro. Hernando Pizarro, a brother of the general, strangled Almagro in 1537. This act was avenged when a son of Almagro murdered Francisco Pizarro in his palace at Lima. Lima was founded by Pizarro in 1535, and his remains are interred in the cathedral of that city, also founded by him.

Pizarro, GONZALO (1502–1548), half brother of the preceding. His brother appointed him governor of Quito in 1540, and after the assassination of Francisco, he raised an army against the new viceroy, Blasco Nuñez, and the latter was defeated and slain near Quito in 1546. But Pizarro did not long enjoy his success, being beaten, taken prisoner, and beheaded.

Plague, a contagious and very fatal febrile disease characterized by entire prostration of strength, stupor, delirium, often nausea and vomiting, and certain local symptoms, as buboes, carbuncles, and livid spots. Like all other malignant fevers the plague has its various stages, but most frequently runs its course

in three days, although death may ensue a few hours after its appearance. If the patient survive the fifth day, he will, under judicious treatment, generally recovery. It is now almost universally admitted that the plague is a specific disease, and that it is the result of a miasmatic poison. It is also well established that unfavorable climatic influences, such as heat and humidity combined, faulty sanitary conditions, inadequate air, light, water, and food, favor its spread when once introduced. There is no specific remedy against the disease, and a variety of treatment has been adopted on different occasions by different medical men. The plague appeared in the most ancient times, although historians have used the term indiscriminately for other epidemics. The first recorded visitation of the plague to Europe is that at Athens (430 B.C.), described by Thucydides; Josephus relates that of Jerusalem A. D. 72. Among the most disastrous plagues of antiquity are those of Rome in 262, when 5,000 persons are said to have died daily; and of Constantinople in 544. From the latter part of the sixth to the twelfth century it ravaged at intervals various parts of Europe, particularly France and Germany. In the thirteenth century it was brought to modern Europe by the Crusaders, and from 1347 to 1350 it traversed all Europe, and was then called the *black death*. The scourge again claimed its victims in the succeeding centuries, and in 1593 it was brought to England by an army returning from the Continent. London lost by the plague 36,269 lives in 1603; 35,500 in 1625; 13,480 in 1636; and 68,600 in 1665. The plague in Marseilles in 1720 caused the drath of over 60,000 in seven months. In 1771 it nearly swept off the whole population of Moscow. Its last appearance in Europe was in 1878–79, on the banks of the Lower Volga.

Plainfield, Union co., N. J., 21 mi. s.w. of New York. Railroad, New Jersey Central. It is the center of an agricultural district. Pop. 1900, 15,369.

Plaintiff, in law courts, the person who commences a suit against another in law or equity.

Plan, in architecture, a drawing showing the design of a building, a term chiefly used in reference to horizontal sections showing the disposition of the walls and various floors of the building, and of the doors and windows, etc.; but also applied to elevations and vertical sections. A *geometrical plan* is one wherein the several parts are represented in their true proportions. A *perspective plan* is one, the lines of which follow the rules of perspective, thus reducing the sizes of the more distant parts. The term is also applied to the draught or representation on paper of any projected work, as the *plan* of a city or of a harbor.

Plane, a joiner's tool, consisting of a smooth-soled solid-block, through which passes obliquely a piece of edged steel forming a kind of chisel, used in paring or smoothing boards or wood of any kind. Planes are of various kinds, as the *jack plane*, used for taking off the roughest and most prominent parts of the wood; the *trying plane*, which is used after the jack-plane; the *smoothing plane* (7½ in. long); and *block plane* (12 in. long), chiefly used for cleaning off finished work, and giving the utmost degree of smoothness to the surface of the wood; the *compass plane*, which has its under surface convex, its use being to form a concave cylindrical surface. There is also a species of plane called *rebate plane*, being chiefly used for making rebates. The *plow* is a plane for sinking a channel or groove in a surface, not close to the edge of it. *Molding planes* are for forming moldings, and must vary according to the design. Planes are also used for smoothing metal, and are wrought by machinery.

Plane Tree, a genus of trees, nat. order Plantaneæ. The American plane-tree or button-wood abounds in American forests, and on the banks of the Ohio attains sometimes a diameter of from 10 to 14 ft., rising 60 or 70 ft. without a branch. The bark is pale green and smooth, and its epidermis detaches in portions; the fresh roots are a beautiful red; the leaves are alternate, palmated, or lobed; and

Oriental Plane; *a*.— branch; *b*.— flower, and *c*.— fruit, on larger scale than *a*.

the flowers are united in little globular, pendent balls. The wood in seasoning takes a dull red color, is finegrained, and susceptible of a good polish, but speedily decays on exposure to the weather. The Oriental plane resembles the preceding, and is plentiful in the forests of Western Asia.

Planet, a celestial body which revolves about the sun as its center, or a body revolving about another planet as its center. The best known *major* planets are, in order of their proximity to the sun, Mercury, Venus, the Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Mercury, Venus, Mars, Jupiter, and Saturn were known to the ancients. Uranus was accidentally discovered by Herschel in 1781, while the discovery of Neptune was the result of pure intellectual work, the calculating of Leverrier and Adams (1845). The planetoids or asteroids are small bodies discovered since the beginning of the present century between the orbits of Mars and Jupiter. The number of these asteroids is annually increased by fresh discoveries; nearly 290

Diagram Showing Comparative Sizes of Sun and Planets.

are now known. Mercury, Venus, the Earth, and Mars closely resemble each other in many respects. They are all of moderate size, with great densities; the earth weighing as much as five and a half times an equal bulk of water. They shine only by reflected sunlight. Jupiter, Saturn, Uranus, and Neptune, on the other hand, are of enormous size, of small densities, some of them weighing less than an equal bulk of water, and probably exist at a high temperature, and give out in addition to reflected sunlight a considerable amount of light and heat of their own. The most colossal of the planets is Jupiter; its volume exceeds that of the earth about 1,200 times. Saturn is next in size. Mars, Jupiter, Saturn, Uranus, and Neptune, being outside the earth's orbit, are sometimes called the *superior planets;* Venus and Mercury, being within the earth's orbit, are called *inferior planets.* The family of major planets has also been subdivided into *intra-asteroidal* planets—Mercury, Venus, the Earth, Mars; and *extra-asteroidal* planets—Jupiter, Saturn, Uranus, and Neptune, the character of the two being very different as above described. The planet which approaches nearest to the earth is Venus, the least distance in round numbers being 23,000,000 mi; the most distant is Neptune, least distance 2,629,000,000 mi.

Planing Machine, a machine tool for planing wood or metal. For the former purpose the usual form has cutters on a drum rotating on a horizontal axis over the board which is made to travel underneath. The cutter drum may be repeated underneath, and at the edges, so as to plane all sides simultaneously. In planing metals the object to be planed, fixed on a traversing table, is moved against a relatively fixed cutter, which has a narrow point and removes only a fine strip at each cut.

Plantagenet, a surname first adopted by Geoffrey, count of Anjou, and said to have originated from his wearing a branch of broom (*plante de genêt*) in his cap. This name was borne by the fourteen kings, from Henry II to Richard III, who occupied the English throne from 1155–1485. In 1400 the family was divided into the branches of Lancaster (Red Rose), and York (White Rose), and from their reunion in 1485 sprang the House of Tudor.

Plantain (or Great Plantain), a common weed, the leaves of which are all radical, oval, and petiolate, and from among them arise several long cylindrical spikes of greenish inconspicuous flowers. The root and seed are still occasionally employed in the treatment of diarrhea, dysentery, and external sores; the seeds are also collected for the food of birds.

Plantain (Plantain tree), a native of the East Indies, is cultivated in mostly all tropical countries. The stem is soft, herbaceous, 15 to 20 ft. high, with leaves often more than 6 ft. long and nearly two broad. The fruit grows in clusters, is about 1 in. in diameter and 8 or 9 inches long. The stem dies down after fruiting; but the root stock is perennial, and sends up numerous fresh shoots annually. It is easily propagated by suckers. The banana (which see) is a closely-allied variety or species. Their fruits are among the most useful in the vegetable kingdom, and form the entire sustenance of many of the inhabitants of tropical climates. A dwarf variety, *M. chinensis,* produces a fruit in European hothouses. The fibers of the leaf stalks of *M. textilis* of the Philippine Islands supplies Manilla hemp or abada, from which cordage of the strongest character is made,

Greater Plantain.

the finer fibers being used in the making of cloth.

Plastering is the art of covering the surface of masonry or woodwork with a plastic material in order to give it a smooth and uniform surface, and generally in interiors to fit it for painting or decoration. In plastering the interior of a house a first coat is generally laid on of lime, thoroughly slacked, so as to be free from any tendency to contract moisture, and mixed with sand and cow's hair. For the purpose of receiving this coat the wall is generally first covered with laths or thin strips of wood, with narrow interstices between. The face of the first coat, which should be of considerable thickness, is troweled, or indented with cross lines by the trowel, to form a key for the finishing coats. The second coat is applied to this when it is thoroughly dried. It is rubbed in with a flat board so as thoroughly to fill the indentations and cover the unequal surface of the first coat with a smooth and even one. In plastering walls great care must be taken to have the surface perfectly vertical. The setting coat, which is of pure lime, or for moldings or finer work, of plaster of Paris or stucco, is applied to the second coat before it is quite dry. A thin coating of plaster of Paris is frequently applied to ceilings after the setting coat.

Plaster of Paris, the name given to gypsum when ground and used for taking casts, etc. If one part of powdered gypsum be mixed with two and a half parts of water a thin pulp is formed, which after a time sets to a hard compact mass. By adding a small quantity of lime to the moistened gypsum a very hard marble-like substance is obtained on setting.

Plata, Rio de la (or River Plate), runs for more than 200 mi. between the Argentine Republic and Uruguay, and is not strictly speaking, a river, but rather an estuary, formed by the junction of the great rivers Paraná and Uruguay. It flows into the Atlantic between Cape St. Antonio and Cape St. Mary, and has here a width of 170 mi. On its banks are the cities and ports of Montevideo and Buenos Ayres. Navigation is hampered in some parts of the river by shallow water and sand-banks. It was discovered in 1515 by Juan Diaz de Solis, and called Rio de Solis; it owes its present name to the famous navigator Cabot.

Plating, the coating of a metallic article with a thin film of some other metal, especially, gold or silver. As regards plating with precious metals, electro-deposition has entirely superseded the old Sheffield method, which consisted in welding plates of various metals at high temperatures. This welding process is now, however, largely employed in plating iron with nickel for cooking vessels, iron with brass for stair rods and other furnishing and domestic requisites, and lead with tin for pipes, etc.

Platinum, one of the metals first made known to Europe in 1741. *Native Platinum* occurs mostly in small irregular grains, generally contains a little iron, and is accompanied besides by iridium, osmium, rhodium, palladium, ruthenium (hence called the "platinum metals"), and also sometimes by copper, chromium, and titanium. It was first obtained in Peru, and has since been found in various other localities, such as Canada, Oregon, the West Indies, Brazil, Colombia, Borneo, etc., but the chief supply of platinum ore comes from the Ural Mountains in Siberia. It was there discovered in beds of auriferous sands in 1823, and has been worked by the Russian government since 1828. Pure platinum is almost as white as silver, takes a brilliant polish, and is highly ductile and malleable. It is the heaviest of the ordinary metals, and the least expansive when heated; specific gravity 21.53 rolled, 21.15 cast. It undergoes no change from the combined agency of air and moisture, and it may be exposed to the strongest heat of a smith's forge without suffering either oxidation or fusion. Platinum is not attacked by any of the pure acids. Its only solvents are chlorine and nitro-muriatic acid, which act upon it with greater difficulty than on gold. In a finely divided state it has the power of absorbing and condensing large quantities of gases. On account of its great infusibility, and its power generally of withstanding the action of chemical reagents, platinum is much used as a material for making vessels to be used in the chemical laboratory. Crucibles, evaporating dishes, etc., are very often made of platinum; so also the large stills used for the evaporation of sulphuric acid. The useful alloys of platinum are not numerous. With silver it forms a tolerably fusible white alloy, malleable and brilliant when polished; but it scales and blackens by working. Gold, by a forge heat, combines with platinum, and the alloys, in all proportions, are more fusible than the latter metal. In the proportion of 38 grs. to 1 oz. it forms a yellowish white, ductile, hard alloy, which is so elastic after hammering that it has been used for watch springs; but the favorable results expected from them have not been realized. Alloyed with iridium (a rare metal of the same group) it possesses an excellent and unalterable surface for fine engraving, as in the scales of astronomical instruments, etc. This alloy has also been adopted for the construction of international standards of length and weight. Mercury, by trituration with spongy platinum, forms an amalgam at first soft, but which soon becomes firm, and has been much used in obtaining malleable platinum. A coating of platinum can be given to copper and other metals by applying to them an amalgam of spongy platinum and 5 parts of mercury; the latter metal is then volatilized by heat. Lead combines with platinum readily; and iron and copper in like manner. The last mentioned, when added in the proportion of 7 to 16 of platinum and 1 of zinc, and fused in a crucible under charcoal powder, forms the alloy called artificial gold. Steel unites with platinum in all proportions, and, especially in the proportion of from 1 to 3 per cent. of platinum, forms a tough and tenacious alloy, well adapted for cutting instruments. Arsenic unites easily with platinum, and is sometimes employed for

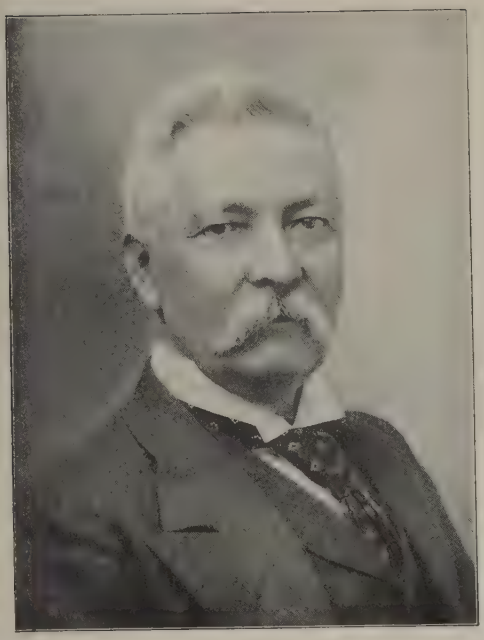
rendering the latter metal fusible. An alloy of platinum, iridium, and rhodium is used for making crucibles, etc. It is harder than pure platinum, is less easily attacked by chemical reagents, and bears a higher temperature without fusing.

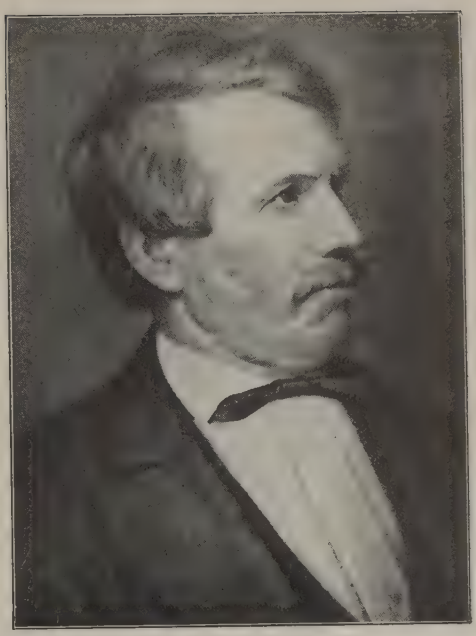
Plato (429–347 B. C), an ancient Greek philosopher, founder of one of the great schools of Greek philosophy, was b. at Athens. Few particulars of his life are known, but it is beyond doubt that he was well connected and carefully educated. About his twentieth year he came directly under the influence of Socrates, and from this time he gave himself entirely to philosophy. Until the death of Socrates he appears to have been his constant and favorite pupil; but after that event Plato is supposed to have left Athens with a view to improving his mind by travel. He is said to have visited Cyrene (in North Africa), Lower Italy, and Sicily. Various other journeys are attributed to him, but without sufficient authority. About B. C. 389 or 388 Plato returned to Athens and began to teach his philosophical system in a gymnasium known as the Academy, his subsequent life being unbroken, except by two visits to Sicily. He appears to have had a patrimony sufficient for his wants, and taught without remuneration. One of his pupils was Aristotle.

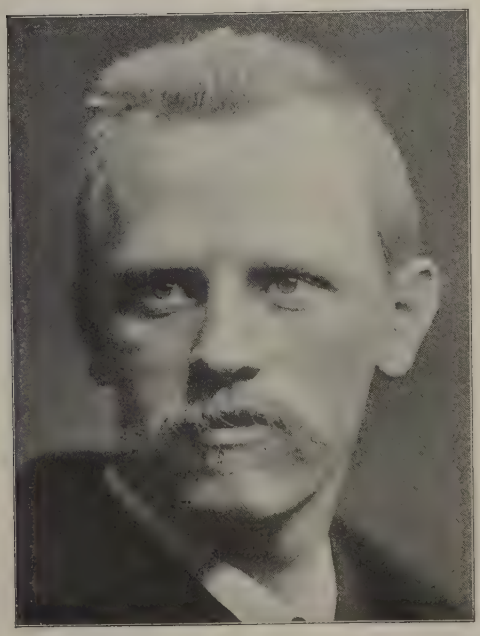
The reputed works of Plato consist of *Dialogues and Letters*, the latter now regarded as spurious; but the genuineness of most of the *Dialogues* is generally admitted. The chronology of the *Dialogues* is a matter of uncertainty. The first attempt at a critical arrangement was made by Schleiermacher, who adopted an arrangement into three divisions, according to the leading doctrines he believed they were intended to inculcate. The chief works in the first section are *Phædrus, Protagoras, Parmenides, Lysias, Laches, Charmides, Euthyphron;* in the second, *Theætetus, Sophistes, Politicus, Phædo, Philebus, Gorgias, Meno, Euthydemus, Cratylus, Symposium;* in the third, the *Republic, Timæus, Critias*, and the *Leges* (or *Laws*). Hermann has attempted to make out a chronological arrangement, and other scholars who differ from Schleiermacher have attempted various theories of constructive arrangement. These schemes in general proceed on the assumption that each dialogue, being an artistic whole, forms a link in a chain. Grote and others, however, do not admit that Plato followed any plan either artistic or didactic. Apart from their philosophical teaching the dialogues of Plato are admirable as works of literature, especially for their dramatic truthfulness, and exhibit Greek prose in its highest perfection. In all of them Socrates (idealized) appears as one of the speakers. They contain also lively and accurate accounts of previous systems of Greek philosophy and their teachers, introduced not merely for historical purposes, but incidentally to the analysis of their opinions. There is an excellent English translation of the whole by Jowett.

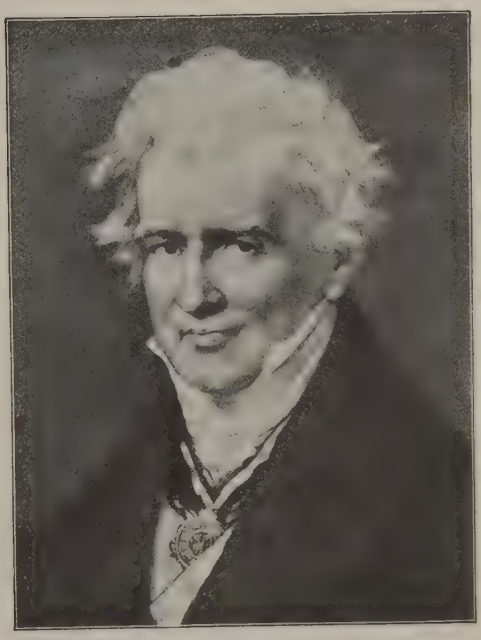
The philosophy of Plato must be regarded as one of the grandest efforts ever made by the human mind to compass the problem of life. After the example of Socrates he held the great end of philosophic teaching to be to lead the mind of the inquirer to the discovery of truth rather than to impart it dogmatically, and for this end he held oral teaching to be superior to writing. This preference appears to have determined the conversational form given to most of his works. Plato originated the distinction of philosophy into the three branches of ethics, physics, and dialectics, although these names were first applied by his disciple Xenocrates. The cardinal principle of Plato's dialectical system is the doctrine of ideas. True science, according to him, was conversant, not about those material forms and imperfect intelligences which we meet with in our daily intercourse with men; but it investigated the nature of those purer and more perfect patterns which were the models after which all created beings were formed. These perfect types he supposes to have existed from all eternity, and he calls them the *ideas* of the great original Intelligence. As these cannot be perceived by the human senses, whatever knowledge we derive from that source is unsatisfactory and uncertain. Plato, therefore, maintains that degree of skepticism which denies all permanent authority to the evidence of sense. Having discovered or created the realm of ideas he surveyed it throughout. He defined its most excellent forms as beauty, justice, and virtue, and having done so he determined what was the supreme and dominant principle of the whole. It is the idea of the Good. The harmony of intelligence throughout its entire extent with goodness, this is the highest attainment of Plato's philosophy. His ethical system was in direct dependence upon his dialectics. He believed that the ideas of all existing things were originally contained in God. These ideas were each the perfection of its kind, and as such were viewed by God with approval and love. God himself being infinitely good was the object of all imitation to intelligent beings, hence the ethics of Plato had a double foundation, the imitation of God and the realization of ideas, which were in each particular the models of perfection. To his cosmical theories he attributed only probability, holding that the dialectical method by which alone truth could be discovered was applicable only to ideas and the discovery of moral principles. The most valuable part of Plato's cosmogony is its first principle, that God, who is without envy, planned all things that they should be as nearly as possible like himself. Plato's political treatises are the application of his ethical principles to social organization. His genius was more adapted to build imaginary republics than to organize real ones; hence his judgment of statesmen is also faulty and often unjust, as, for instance, in the case of Pericles and Themistocles. He was guided by one grand principle, which is mentioned in several of his writings, that the object of the education and instruction of young people, as well as of the government of nations, is to make them better, and whoever loses sight of this object, what-

Plato









EXPLORERS

Henry M. Stanley
Fridtjof Nansen

David Livingstone
Alexander von Humboldt

Plate 28, Vol. III

ever merit he may otherwise possess, is not really worthy of the esteem and approbation of the public.

Platonic Love, a term by which is generally understood a pure spiritual affection between the sexes unmixed with carnal desires, and regarding the mind only and its excellences.

Platt, THOMAS C., b. in New York in 1833. He was educated at Yale College and later became president of Tioga National Bank. He was a member of Congress from 1872 to 1876, and was chosen U. S. senator in 1881. He resigned this position on account of a disagreement with President Garfield as to federal patronage, and failed of re-election. In 1880 he became president of the U. S. Express Company, and in 1897 was elected U. S. senator from New York.

Plattdeutsch (plät'doich) (or Low German), is the language of the North German Lowlands, from the borders of Holland to those of Russian Poland. The Dutch and Flemish languages also belong to the Low German dialects, but being associated with an independent political system, and having a literature of their own, are reckoned as distinct languages. The Low German dialects agree in their consonantal system not only with Dutch and Flemish, but also with English and the Scandinavian tongues. See *Philology*. Until the Reformation Low German was the general written language of the part of the Continent above mentioned; but from that time Low German works became gradually fewer, owing to the position now taken by the High (or modern classical) German. Even as a spoken language High German has ever since been slowly superseding the Low. In recent times, however, Low German literature has received a new impetus from Klaus Groth and Fritz Reuter. Linguistically the Low German dialects have received a good deal of attention, and many valuable lexicographical works have appeared.

Platte (plat), a river which rises in the Rocky Mountains by two branches, called respectively the North and South Forks of the Platte. The united stream falls into the Missouri after a course of about 1,600 mi. It is from 1 mi. to 3 mi. broad, shallow, encumbered with islands, has a rapid current, and therefore not navigable.

Plattsburgh, Clinton co., N. Y., on Lake Champlain. Railroad: Del. & Hudson Canal Co., and Chateaugay. Industries: type-writing machines, two flouring mills, iron foundry, shirt and sewing machine factories. Surrounding country agricultural and mineral. The town was first settled in 1784 and became a city in 1815. Pop. 1900, 8,434.

Plattsmouth, Cass co., Neb., on Missouri River, at mouth of the Platte, 21 mi. s. of Omaha. Railroads: B. & M. R., and Missouri Pacific. Industries: large railroad shops, machine shops, flour mills, canning factories, etc. Grain, lumber, and cattle are shipped. Pop. 1900, 4,964.

Plauen, a thriving manufacturing town in Saxony, circle of Zwickau, in a beautiful valley on the left bank of the Elster, 60 mi. s. of Leipsic, 78 mi. w.s.w. of Dresden. It is walled and has a castle. Manufactures machinery, paper, leather, calicoes, and extensively all kinds of embroidered goods. Pop. 47,077.

Plautus, TITUS MACCIUS (254–184 B. C.), one of the oldest and best Roman comic writers, and one of the founders of Roman literature, b. at Sarsina, in Umbria. We have few particulars of his life. He is said to have been first connected with a dramatic company at Rome; then to have engaged in business, but losing his means was at one time in a very destitute condition, and compelled to earn his livelihood by turning a baker's hand-mill, in which position he became a successful writer of comedies. The purity of his language, his genuine humor, and his faithful portrayal of middle and lower class Roman life, made him a great favorite with the Roman public, and his plays successfully held the stage for some centuries. He was much admired by Cicero and Varro. For his characters, plots, scenes, etc., he was chiefly indebted to the poets of the new Attic comedy, but the language was his own. Some twenty of his plays have been preserved to us.

Plebeians (ple-bē'anz) (or Plebs), in ancient Rome, one of the great orders of the Roman people, at first excluded from nearly all the rights of citizenship. The whole government of the state, with the enjoyment of all its offices, belonged exclusively to the patricians, with whom the plebeians could not even intermarry. The civil history of Rome is to a great extent composed of the struggles of the plebeians to assert their claim to the place in the commonwealth to which their numbers and social importance entitled them, and which were crowned with complete success when (B.C. 286) the *Lex Hortensia* gave the *plebiscīta*, or enactments passed at the plebeian assemblies, the force of law. From this time the privileges of the two classes may be said to have been equal.

Plehve, WJATSCHESLAVO KONSTANTINOVITSCH (1848-1904), Russian Minister of the Interior. He is the son of a poor nobleman, but was patronized by a wealthy aristocrat, and when of age became, successively, imperial counsel at Warsaw, procurator at St. Petersburg, chief of state police, Assistant Minister of Interior and in 1902 Minister of Interior. He has a reputation for great severity toward the dependent peoples of Russia. Plehve was assassinated at St. Petersburg, July 28, 1904.

Pleiades (pli'a-dēz), the so-called "seven stars" in the neck of the constellation Taurus, of which only six are visible to the naked eye of most persons. They are regarded by Mädler as the central group of the Milky Way. Ancient Greek legends derive their name from the seven daughters of Atlas and the nymph Pleione, fabled to have been placed as stars in the sky, and the loss of the seventh was variously accounted for. In reality the cluster consists of far more than seven stars.

Ple'onasm, in rhetoric, is a figure of speech by which we use more words than seem absolutely necessary to convey our meaning, in order to express a thought with more grace or greater energy; it is sometimes also applied to a needless superabundance of words.

Pliny (Caius Plinius Secundus), Roman writer, commonly called *Pliny the Elder*, was b. A. D. 23, probably at Comum (Como). He went to Rome at an early age, and having means at his disposal availed himself of the best teachers. He served with distinction in the field, and after having been made one of the augurs of Rome, he was appointed governor of Spain. Every leisure moment that he could command was devoted to literature and science, and his industry was so great that he collected an enormous mass of notes, which he utilized in writing his works. He adopted his nephew, Pliny the Younger, A. D. 73, and perished in the eruption of Mount Vesuvius which overwhelmed Pompeii and Herculaneum in 79. The only work of Pliny which is now extant is his *Natural History*, a work containing a mass of information on physics, astronomy, etc., as well as natural history proper.

Pliny (Caius Plinius Cæcilius Secundus), *the Younger*, a nephew of the former, was b. A. D. 61 at Comum (Como). Having lost his father at an early age, he was adopted by his uncle, and inherited the latter's estates and MSS., and also his industry and love of literature. He filled several public offices, and was consul in A. D. 100. In A. D. 103 he was appointed prop*r*ætor or governor of Pontica, which office he administered for almost two years to the general satisfaction. He was one of the most distinguished and best men of his age. The time of his death is unknown, but it is supposed that he died about the year 115. As an author he labored with ardor, and attempted both prose and poetry. Of his writings only a collection of letters in ten books, and a panegyric on Trajan, remain.

Plotī'nus (205–270), the systematic founder of Neo-Platonism, b. at Lycopolis, in Egypt. In his twenty-eighth year the desire to study philosophy awoke in him, but he got no satisfaction from his teachers till a friend led him to Ammonius Saccas. He spent eleven years near this excellent master, and the knowledge he had acquired created an ardent desire in him to know also the teachings of the Persian and Indian philosophers. For this purpose he joined the expedition of the Emperor Gordian to the East in 242, but after the latter's death he reached Antioch with difficulty and returned to Rome, where he subsequently lived and taught. At first he taught orally, but after ten years he was prevailed upon to commit his doctrines to writing, and he composed twenty-one books, which were only put into the hands of the initiated. About 262–264 Porphyry became his pupil, and during his six years' stay in Rome, twenty-four books were written by Plotinus, and nine more after Porphyry had left for Sicily. On account of the weakness of his sight Plotinus left the correction of his works to Porphyry, who also was his literary executor, and has arranged his works in six Enneads, which form the bible of the New Platonists. His teaching secured him great respect and popularity among the Romans. He was held to be so wise and virtuous that parents left their children to his care. He enjoyed the favor of the emperor Gallienus, and he even succeeded in inspiring the fair sex with a desire to study philosophy. The writings of Plotinus are often obscure and even incomprehensible, but on the whole they exhibit a fertile and elevated mind and close reasoning. His system depends less upon the intrinsic truth it contains than upon its historical value, which is great both in its antecedents and consequents. Plotinus was well acquainted with the older Greek philosophy, with the Ionian and the Eleatic schools, with Plato and Aristotle and other founders of systems, and according to the eclectic tendencies of his day he believed there was a fundamental unity in these various systems. It was to Plato, however, that Plotinus looked as his great authority. He believed himself a strict follower of Plato, and his own system a legitimate development of the principles of that great philosopher.

Plover, the common name of several species of grallatorial birds belonging to the genus *Charadrius*. They inhabit all parts of the world. They are gregarious, and most of them are partial to the muddy borders of rivers and marshy situations, subsisting on worms and various aquatic insects; but some of them affect dry sandy shores. Their general features are: bill long, slender, straight, compressed; nostrils basal and longitudinal; legs long and slender, with three toes before, the outer connected to the middle one by a short web; wings middle-sized. Most of them molt twice a year, and the males and females are seldom very dissimilar in appearance. The various species pass so imperceptibly into one another that their classification is often attended with difficulty. All nestle on the ground. They run much on the soil, patting it with their feet to bring out the worms, etc. The golden plover, also called yellow and whistling plover, is the best known, and its flesh and its olive-green dark-spotted eggs are considered a delicacy by epicures.

1.—Ringed plover; 2.—gray plover; 3.—golden plover.

Plow, an implement drawn by animal or steam power, by which the surface of the soil

is cut into longitudinal slices, and these successively raised up and turned over. The object of the operation is to expose a new surface to the action of the air, and to render the soil fit for receiving the seed or for other operations of agriculture. Plows drawn by horses or oxen are of two chief kinds: those without wheels, commonly called *swing plows*, and those with one or more wheels, called *wheel plows*. The essential parts of both kinds of plows are, the beam, by which it is drawn; the stilts or handles, by which the plowman guides it; the coulter, fixed into the beam, by which a longitudinal cut is made into the ground to separate the slice or portion to be turned over; the share, by which the bottom of the furrow-slice is cut and raised up; and finally, the mold-board, by which the furrow-slice is turned over. The wheel plow is merely the swing plow with a wheel or pair of wheels attached to the beam for keeping the share at a uniform distance beneath the surface. Besides these two kinds there are *subsoil plows*, *drill plows*, *draining plows*, etc. Every part of a plow of the modern type is made of iron. *Double mold-board plows* are common plows with a mold-board on each side, employed for making a large furrow in loose soil, for earthing up potatoes, etc. *Turnwrest plows* are plows fitted either with two mold-boards, one on each side, which can be brought into operation alternately, or with a mold-board capable of being shifted from one side to the other, so that, beginning at one side of a field, the whole surface may be turned over from that side, the furrow being always laid in the same direction. One of these plows with two mold-boards is so constructed as to be dragged by either end alternately, the horses and plowmen changing their position at the end of every furrow. Such plows are useful in plowing hillsides, as the furrows can all be turned toward the hill, thus counteracting the tendency of the soil to work downward. In the most improved style of wheel plow there are a larger and a smaller wheel, the former to run in the furrow, the latter on the land. These have also a second or skim coulter, for use in lea plowing, to turn over more effectually the grassy surface. What is called a *gang plow* is essentially a number of plows combined, four, six, or eight shares being fixed in one wheeled frame, and dragged by a sufficient number of horses, such plows being used on very large farms. *Steam plows* on various principles have latterly been introduced into the U. S. Some are driven by one engine remaining stationary on the headland, which winds an endless rope (generally of wire) passing round pulleys attached to an apparatus called the "anchor," fixed at the opposite headland, and round a drum connected with the engine itself. Others are driven by two engines, one at either headland, thus superseding the "anchor." As steam-plowing apparatus are usually beyond both the means and requirements of single farmers, companies have been formed for hiring them out. In steam plowing it is common to use plows in which two sets of plow bodies and coulters are attached to an iron frame moving on a fulcrum, one set at either extremity, and pointing different ways. By this arrangement the plow can be used without turning, the one part of the frame being raised out of the ground when moving in one direction, and the other when moving in the opposite. It is the front part of the frame, or that farthest from the driver, which is elevated, the plowing apparatus connected with the after part being inserted and doing the work. Generally two, three, or four sets of plow bodies and coulters are attached to either extremity, so that two, three, or four furrows are made at once.

Plum, a genus of plants belonging to the nat. order Rosaceæ, sub-order Amygdaleæ. About a dozen species are known, all inhabiting the north temperate regions of the globe. They are small trees or shrubs, with alternate leaves and white flowers, either solitary or disposed in fascicles in the axils of the leaves. The common garden plum, introduced from Asia Minor, is the most extensively cultivated, and its fruit is one of the most familiar of the stone fruits. The varieties are very numerous, differing in size, form, color, and taste. Some are mostly eaten fresh, some are dried and sold as prunes, others again are preserved in sugar, alcohol, syrup, or vinegar. They make also excellent jams, jellies, and the syrup from stewed plums forms a refreshing drink for invalids, and a mild aperient for children. Perhaps the most esteemed of all varieties is the green gage. A very popular and easily grown sort is the *P. damascēna* or damson. The wood of the plum tree is hard, compact, traversed with reddish veins, susceptible of a fine polish, and is frequently employed by turners and cabinetmakers. The sloe or black-thorn is a species of wild plum bearing a small, round, blue-black, and extremely sour fruit. Its juice is made into prune wine, which is chiefly employed by distillers, wine and spirit merchants, etc.; for coloring, purifying and mellowing spirits. See colored plate, Fruits—Apple.

Plummet (plumb line), a leaden or other weight let down at the end of a cord to regulate any work in a line perpendicular to the horizon, or to sound the depth of anything. Masons, carpenters, etc., use a plumb line fastened on a narrow board or plate of brass or iron to judge whether walls or other objects be perfectly perpendicular, or *plumb* as the artificers call it. Near a range of high mountains the plumb line, as can be shown by special arrangements, is not perfectly true, but inclines toward the mountains; and officers in charge of the U. S. Coast and Geodetic Survey among the Hawaiian Islands have recently observed that the deviation of a plumb line from the vertical is greater in the case of mountains in an island than in continental mountains, and greater in the neighborhood of extinct volcanoes than in that of active volcanoes. In given localities the plumb line also varies according to the ebb and flow of the tide.

Plumptre, Edward Hayes (1821–1891), Dean of Wells. He graduated B. A. at Oxford 1844, M. A. 1847, when he was appointed chaplain

at King's College, London, and professor of pastoral theology in 1853. He became successively prebendary of St. Paul's, London (1863), rector of Pluckley, Kent (1869), vicar of Bickley, Kent (1873), principal of Queen's College, London (1875), and dean of Wells (1881). As an able theologian and preacher he was chosen a member of the Old and New Testament revision companies in England, select preacher at Oxford (several times), Boyle lecturer (1866–67), Grinfield lecturer (1872–74). He has written a number of valuable works on theology, many of his sermons and lectures have been published, and the reviews and religious periodicals contain numerous contributions by him. We have besides from his pen several translations, including *Sophocles* (1866), *Æschylus* (1870), *Dante* (1887). His latest important literary work is a *Life of Thomas Ken, Bishop of Bath and Wells* (1888). The degree of D. D. was conferred by Glasgow University in 1875.

Plush, a fabric similar to velvet, from which it differs only in the length and density of the nap. The nap may be formed either in the warp or woof, the one in which it is being double, there being a warp and a woof for the body of the cloth, and a warp or woof for the nap. Plushes are now made almost exclusively of silk. The cheaper qualities have a cotton backing. Some of the finest dress plushes are produced in London, plushes for gentlemen's hats come chiefly from Lyons, while common or imitation plushes are largely manufactured in Germany. Plush is now also extensively used in upholstery and decorative work.

Plutarch (plö'tärk), a learned Greek writer, b. at Cheronæa in Bœotia, where he also died. Neither the year of his birth nor that of his death is accurately known, but it is generally held that he lived from the reign of Nero to that of Adrian (54–117 A.D). He appears from his writings to have visited Italy, lectured there on philosophy, and stayed some time at Rome, where he established a school during the reign of Domitian. His *Parallel Lives of Illustrious Greeks and Romans* is the work to which he owes his fame. The lives are nearly all written in pairs, one Greek and one Roman, followed by a comparison of the two, and are models of biographical portraiture. We have numerous editions and translations of them. Plutarch's other works, about sixty in number, are generally classed as *moralia*, though some of them are narrative. His writings show that he was well acquainted with the literature of his time, and with history, and that he must have had access to many books.

Pluto, in classical mythology, the god of the infernal regions, the ruler of the dead. He was a son of Chronus and Rhea, a brother of Zeus (Jupiter) and Poseidon (Neptune), and to him, on the partition of the world, fell the shades. He married Persephonē. By the Greeks he was generally called Hades and by the Romans Orcus, Tartarus, and Dis Pater. As is the case with all other pagan deities, the accounts of Pluto vary with different writers and periods, and in later ages he was confounded with Plutus. The worship of Pluto was extensively spread among the Greeks and Romans. The cypress, the box, the narcissus, and the plant adiantum (maiden-hair), were sacred to him; oxen and goats were sacrificed to him in the shades of night, and his priests were crowned with cypress. He is represented in gloomy majesty, his forehead shaded by his hair, and with a thick beard. In his hand he holds a two-forked scepter, a staff, or a key; by his side is Cerberus. He is often accompanied by his wife.

Plutonic Rocks, unstratified crystalline rocks, such as granites, greenstones, and others, of igneous origin, formed at great depths from the surface of the earth. They are distinguished from those called volcanic rocks, although they are both igneous; plutonic rocks having been elaborated in the deep recesses of the earth, while the volcanic are solidified at or near the surface.

Plutus, in Greek mythology, the god of riches. Zeus struck him blind because he confined his gifts to the good; and thenceforth conferred them equally on the good and the bad. His residence was under the earth. Plutus is the subject of Aristophanes's comedy of the same name.

Plymouth (plim'uth), a seaport, municipal, and parliamentary borough of England, in Devonshire, at the head of Plymouth Sound, between the estuaries of the Plim and Tamar, It is well defended both land and seaward by a series of forts of exceptional strength provided with heavy ordnance. Charitable and educational institutions abound. The manufactures are not very extensive, and chiefly connected with ships' stores; but the fisheries are valuable, and Plymouth has a large export and coasting trade. Its chief importance lies in its position as a naval station.

Plymouth, Plymouth co., Mass., on Massachusetts Bay, 37 mi. s.e. of Boston. Railroad, N. Y. N. H. & H. Industries: cordage, iron foundry, two woolen mills, two cotton mills, rolling mills, bedstead, zinc, tack and nail, and other factories. Surrounding country agricultural. The town was first settled in 1620 by the Pilgrim Fathers. Pop. 1900, 9,592.

Plymouth, Luzerne co., Pa., on Susquehanna River, 4 mi. w. of Wilkesbarre. Railroad, D. L. & W. It is an important coal mining town, having twelve large breakers in operation. Pop. 1900, 13,649.

Pneumatic Dispatch, propulsion by means of compressed air or by forming a vacuum. Pneumatic railways have thus far proved abortive, but propulsion by compressed air has of recent years been successfully applied to a variety of practical uses. Parcels are thus conveyed, and internal communication in warehouses, hotels, etc., is carried on by its means. The most developed application of compressed air as a motive force is in connection with the telegraph service of large cities. Pneumatic dispatch has proved a most useful auxiliary in securing prompt and cheap collection and distribution of telegraphic messages. The vehicles charged with the messages, technically called *carriers*, are forced through leaden tubes con-

necting the various stations, and from 1½ to 3 in. diameter, by means of air pressure at one end, or sucked through by a partial vacuum at the other. The invention of Latimer Clark and Varley required a separate tube between each pair of stations, and admitted of only a single dispatch at a time; but a system of laying tubes in circuit for the continuous transmission of dispatches, by means of an uninterrupted air current in one direction, was adopted in Berlin by Messrs. Siemens and Halske in 1863. The tubes run in all directions. In the central districts, where the transmission is heavy, the stations are connected by a double tube, a receiving and a despatching one, forming a complete circuit, with a column of air always passing through it, and which is moved either by pressure, or by vacuum, or both. The up and down lines may be opened through their entire length, or blocked by switch boxes at an intermediate station. The terminal stations can send carriers to be stopped by the switch box at an intermediate station; and the intermediate station, when it knows a through carrier to be coming for one of the termini, can, if it happen to have any messages to send to that terminus, switch out the through carrier and insert its own messages without appreciable delay. The carriers in the 3 in. tubes hold about 50 messages. It is estimated that work may be performed by one of these tubes which would require six wires and twelve clerks. The circuit system, but not with a continuous current, is extensively used in Paris. The tubes are of iron, 2 ft. in diameter. Trains leave the central station at fixed intervals and make the circuit. Other European cities have similar systems. American cities work the English system, but brass instead of lead tubes are employed.

Pneumatics, that branch of physics which treats of the mechanical properties of elastic fluids, and particularly of atmospheric air. The chemical properties of elastic fluids (air and gases) belong to chemistry. Pneumatics treats of the weight, pressure, equilibrium, elasticity, density, condensation, rarefaction, resistance, motion, etc., of air; it treats also of air considered as the medium of sound (acoustics), and as the vehicle of heat, moisture, etc. It also comprehends the description of those machines which depend chiefly for their action on the pressure and elasticity of air, as the various kinds of pumps, artificial fountains, etc. The weight of the air, and its pressure on all the bodies on the earth's surface, were quite unknown to the ancients, and only first perceived in the middle of the seventeenth century by Galileo, when a sucking pump refused to draw water above a certain height; and to Torricelli, his pupil, belongs the honor of giving first a natural explanation of the phenomenon.

Pneumatic Tires.—The rubber used for pneumatic tires comes to the factory in large lumps known as "hams." First these lumps of crude rubber are cleaned and made into sheets. They are then taken to the drying room, where they are subjected to a temperature of 90° for about 24 hours. This causes a shrinkage of about 15 per cent. The gum used for the inner tubes is left more nearly pure than that used for any other purpose. The gum and other ingredients are passed between a pair of smooth, hollow, iron rollers running at different rates of speed. The friction thus caused generates heat, so that it is necessary to keep the rollers cool by means of a stream of water circulating through them. When the compound has been thoroughly warmed up by this friction it comes from the rollers in a smooth, semi-transparent sheet of delicate, chocolate tint. The sheet is then carried to the calenders, where it is drawn down to one thirty-second of an inch in thickness. At the same time it is cut to the width required for making a tire. It is then rolled up on a wooden core with a sheet of muslin between the layers of rubber. Next the rubber goes to the tube-room. Here two men unroll the rubber strips upon a table and cut them into proper lengths for a tube. The strips are then passed over to the next table, where they are rolled into shape after both surfaces have been covered with soapstone. At the next table a nozzle is attached to the end of the tube, and soapstone is blown through it to prevent adhesion of the inner surface. The tubes are then inspected, cut into the exact lengths, and the ends are closed up by inserting the forefinger, upon which is wrapped a piece of cloth dipped in benzine, and next sticking the ends into an ordinary clothes wringer. In the curing room the tubes go into a heater where they are subjected to a pressure of forty pounds for about four hours. The stems through which the tires are to be inflated are set on with a rubber solution. Then the tires are subjected to a final inspection by being inflated with compressed air and immersed in a tank of water. If any bubbles rise in the water the tire is faulty. The valves are then put into the stems and tied. This finishes the tube.

The casing stock from which the outer part of the tire is made is mixed by a different process from that used for the tube stock. After this the process of milling and calendering and cutting to the required width is identical with that just described for the tube stock. The "friction cloth," which forms the inner part of the outer tube, is made of strong duck which is tested by being subjected to a breaking strain of 200 pounds, and is then passed through a calender, which presses rubber, mixed by still another secret process, upon both sides and into the meshes of the cloth at an enormous pressure. This friction cloth is cut into diagonal strips just half the length necessary for a tire.

In the building room two strips of friction cloth are laid on a bench with a little groove down the center. A steel mandrel the size of the tire is lifted on the bench and rolled down the groove, the friction cloth being taken up and rolled around the mandrel as it rolls. The mandrels are warm and are painted with a solution of soapstone to prevent the rubber from sticking. A strip of casting stock is then

laid down over the groove on the bench, and the mandrel covered with the friction cloth is rolled back the other way, the builder gathering up the casing and pressing it upon the friction cloth until it adheres smoothly upon the outer surface. From the builders the mandrels go to the press room where they are put in large iron molds and subjected to heavy pressure and heat. The mandrels are taken out and thrown upon a bench, where a slit about six inches long is cut on the inner side, and the mandrel is put in a vise. The slit is then slipped over one of the ends of the mandrel which is readily pulled out. The casings then go to the trimmers. One man smooths off the outer edge with a pair of shears, and the other trims off the inner edge. The perfect casings then go to the perforator, who punches a hole for the valve and a dozen holes for sewing the slit. The next process is to draw the tubes through the casing. A strip of canvas is pasted to the end of the tube that lies under the slit to protect it from the needle. The tires are then inflated, taken to the storage room, and made ready for shipment.

Po, the largest river of Italy. It rises on the confines of France and Piedmont in Mount Viso, one of the Cottian Alps, and receives during its long course to the Adriatic (about 450 mi.) a vast number of tributary streams. It divides the great plain of Lombardy into two nearly equal parts, and is the grand receptacle for the streams flowing south from the Alps, and for the lesser waters that flow north from a part of the Apennine range. Its principal affluents are, on the left, the Baltea, Sesia, Ticino, Adda, and Mincio; on the right, the Tanaro, Trebbia, and Panaro. The Po, in spite of embankments, etc., is the cause of frequent inundations, especially near its mouth. In some places, owing to the silt carried down, its channel is now raised above the country through which it flows. Fish are plentiful in it, including the shad, salmon, and even sturgeon.

Pocahon'tas (1595-1617), daughter of Powhatan, a celebrated American Indian warrior of Virginia. Some romantic incidents are told of her life, but there seem to be considerable doubts as to their truth. She is said to have shown a great friendship for the English who colonized Virginia, and to have rendered them substantial services. In 1607 she prevailed on her father to spare the life of Captain John Smith, his prisoner, and two years later frustrated a plot to destroy him and his party. After Captain Smith had left the colony she was kept as a hostage by an English expeditionary force (1612). During this detention she married Mr. Rolfe, an Englishman, who in 1616 took her on a visit to England, where she was baptized and assumed the name of Rebecca. She left one son, who was educated in London, and whose descendants are said to exist still in Virginia.

Pochard, a subfamily of Anatidæ or ducks, inhabiting the Arctic regions. They migrate southward in winter to the coasts of North America and Europe; and they even occur in Asia and in the Southern hemisphere. They are marine in habits, and feed upon crustaceans, worms, mollusks, and aquatic plants. There are numerous species, and the flesh of several is much prized as food. A typical form and one of the best known is the common pochard, variously called dunbird, red-headed poker, red-headed widgeon or duck. The head and neck are bright chestnut; eyes red; bill long; a broad, transverse, and dark-blue band on the upper mandible; length 16 to 17 in.; weight 1 to 2 lbs. Other familiar varieties are the long-tailed duck, the scaup pochard, the tufted pochard, and the canvas-backed duck of North America, so highly esteemed by epicures.

Podiebrad (pod'ye-brâd), George (1420–1471), king of Bohemia. In 1444 he became one of the two governors of Bohemia during the minority of Ladislas, Albert's posthumous son, now king of the country, and, after overcoming the Catholic opposition, sole regent in 1451. Ladislas died in 1457, and Podiebrad was elected to the throne in the following year, and crowned by the Catholic bishops in 1459. He inaugurated his reign by the introduction of various beneficent laws, wise administration, and a policy of conciliation toward the Catholics.

Podo'lia, a government of Southwestern Russia; area 16,224 sq. mi. The country is mostly flat but a low branch of the Carpathians extends through it in an easterly direction. The principal rivers are the Dniester and the Bug. The climate is temperate and salubrious, the soil generally very fertile; in fact, Podolia forms one of the most valuable agricultural possessions of the Russian Empire. Manufactures are spreading rapidly, and beet sugar, spirits, flour, and tobacco are produced in great quantities. The trade with Germany, Austria, and Odessa is extensive. Capital Kamenetz. Pop. 2,350,000.

Poe, Edgar Allan (1809–1849), poet, was b. at Boston. He was educated at the University of Virginia and became a private in the U. S. Army in 1827. Three years later he entered West Point, but was dismissed in disgrace in 1831. He then married Virginia Clemen and settled at Baltimore. In 1835 he moved to Richmond, three years later to Philadelphia, and in 1844 to New York. Poe was essentially a poet. His strange, half-romantic, half-sordid life, and his habitual melancholy and morbidness undoubtedly greatly influenced his writings. He is remembered principally for *The Raven,* an exceptionally beautiful poem. Pl. 23, Vol. III.

Poe'rio, Carlo (1803–1867), an Italian statesman, b. at Naples. The revolution of 1848 placed him at the head of the Neapolitan police, and of the ministry of public instruction, but, finding it impossible to get the Bourbons to fulfill their promises, he resigned. He sat in the new parliament and acted with the Opposition. In 1849 he was arrested and condemned without defense to twenty-four years' imprisonment. The barbarous treatment he received in prison gave occasion to Gladstone's

famous *Two Letters to Lord Aberdeen*, written in 1851 from Naples. In 1859 his sentence was commuted to transportation to South America; but he and his companions in misfortune effected a landing at Cork in Ireland, and thence proceeded to London. In 1861 he was elected vice president of the Italian Chamber of Deputies.

Poetry, that one of the fine arts which exhibits its special character and powers by means of language; or, according to Aytoun, the art which has for its object the creation of intellectual pleasures by means of imaginative and passionate language, and language generally, though not necessarily, formed into regular numbers. It has also been defined as the concrete and artistic expression of the human mind in emotional and rhythmical language. It is the earliest form of literature, and also the final and ideal form of all pure literature: its true place lying between music on the one hand, and prose or loosened speech on the other. The poet deals with language as the painter does with color, sometimes invading the domain of music and sometimes that of prose, or rather he brings prose into the domain of poetry. The two great classes of poetic impulse are dramatic imagination and lyric imagination. Partaking of the character of both is epic or narrative poetry. To the dramatic class belong tragedy and comedy; to the lyric belong the song, hymn, ode, anthem, elegy, sonnet, and ballad, though the last named frequently has a kind of epic character. Other forms, such as "didactic" poetry, "satirical" poetry, are also in use, but it is a question if they enter into the circle of poetry at all.

Pointer Dog, a breed of sporting dogs, nearly allied to the true hounds. The original breed is Spanish, but a cross with the fox-hound is now generally used. It is smooth, short-

Pointer Standing at Game.

haired, generally marked black and white like the foxhound, but occasionally a uniform black. It derives its name from its habit of stopping and pointing with the head in the direction of game, discovered with a very acute sense of smell. The dog once having pointed remains perfectly quiet. This faculty in the pointer is hereditary, but is better developed by training.

Poison, any agent capable of producing a morbid, noxious, dangerous, or deadly effect upon the animal economy, when introduced either by cutaneous absorption, respiration, or the digestive canal. Poisons are divided, with respect to the kingdom to which they belong, into animal, vegetable, and mineral; but those which proceed from animals are often called *venoms*, while those that are produced by disease have the name *virus*. With respect to their effects they have been divided into four classes, namely, irritant, narcotic, narcotico-acrid, and septic or putrescent. Many poisons operate chemically, corroding the organized fiber, and causing inflammation and mortification. To this class belong many metallic oxides and salts, as arsenic, one of the most deadly poisons; many preparations of copper, mercury, antimony, and other metals; the mineral and vegetable acids: the substance derived from some plants, as the spurges and mezereon; and cantharides, from the animal kingdom. Other poisons exercise a powerful action upon the nerves and a rapid destruction of their energy. These are the sedative or stupefying poisons, and belong for the most part to the vegetable kingdom. Opium, hemlock, henbane, belladonna, are the best known forms of this poison. Prussic acid, a poison obtained from the kernels of several fruits, the cherry laurel, etc., is one of the most rapid destroyers of life. Among plants there are many which unite the properties of both kinds, as the common foxglove, and the monkshood or aconite. An alkaloid is extracted from the latter, $\frac{1}{16}$th of a grain of which has proved fatal. Another class of poisons suddenly and entirely cause a cessation of some function necessary to life. To this class belong all the kinds of gas and air which are irrespirable, suffocating vapors, as carbonic acid gas, fumes of sulphur and charcoal, etc. Many preparations of lead, as acetate or sugar of lead, carbonate or white lead, etc., are to be counted in this class. The effects of poisons materially depend on the extent of the dose, some of the most deadly poisons being useful remedies in certain quantities and circumstances. Antidotes naturally vary with the different kinds of poisons. They sometimes protect the body against the operation of the poison, sometimes change this last in such a manner that it loses its injurious properties, and sometimes remove or remedy its violent results. Thus in cases of poisoning by acrid and corrosive substances we use the fatty, mucilaginous substances, as oil, milk, etc., which sheathe and protect the coats of the stomach and bowels against the operation of the poison. Against the metallic poisons substances are employed which form with the poison insoluble compounds, such as freshly prepared hydrated oxide of iron, or dialysed iron for arsenic; albumen (white of egg) for mercury; Epsom or Glauber's salts for lead. Lime, chalk, and magnesia are the best remedies for the powerful acids. For cantharides, mucilage, gruel, and barley water are employed. We oppose to the alkaline poisons the weaker vegetable acids, as vinegar. Prussic acid is neutralized by alkalies and freshly precipitated oxide of iron. To arouse those poisoned by opium, we use cof-

fee and ammonia, and belladonna as an antagonistic drug. Chloral hydrate poisoning is similarly treated; and for strychnia or nux vomica, anima' charcoal in water and chloral hydrate are used.

Poitiers (pwâ-tyā) (or Poictiers), a town of France, on the Clain, formerly capital of the province of Poitou, at present of the department of the Vienne. The principal edifice is the cathedral. Poitiers is one of the most ancient towns of France, and the vestiges of a Roman palace, of Roman baths, of an aqueduct, and an amphitheater still remain. Two famous battles were fought in its vicinity, that in which Charles Martel defeated the Saracen army in 732, and that between the French under their king John II and the English under Edward the Black Prince in 1356. The manufactures are unimportant, but there is a large trade. Pop. 34,219.

Pokeweed, a North American branching herbaceous plant. Its root acts as a powerful emetic and cathartic, but its use is attended with narcotic effects. Its berries are said to possess the same quality; they are employed as a remedy for chronic and syphilitic rheumatism, and for allaying syphiloid pains. The leaves are extremely acrid, but the young shoots, which lose this quality by boiling in water, are eaten as asparagus.

Polacca (or Polacre), a three-masted vessel used in the Mediterranean. The masts are usually of one piece, so that they have neither tops, caps, nor cross trees. It carries a fore-and-aft sail on the mizzen mast, and square sails on the main mast and fore mast.

Po'land, an extensive territory of Central Europe, which existed for many centuries as an independent and powerful state; but having fallen a prey to internal dissensions, was violently seized by Austria, Prussia, and Russia as a common spoil, partitioned among these three powers, and incorporated with their dominions. In its greatest prosperity it had at least 11,000,000 inhabitants, and an area of 350,000 sq. mi., and immediately before its first partition an area of about 282,000 sq. mi., stretching from the frontiers of Hungary and Turkey to the Baltic, and from Germany far east into Russia, forming one compact kingdom. With the exception of the Carpathians, forming its southwestern boundary, and a ridge of moderate elevation penetrating into it from Silesia, the country presents the appearance of an almost unbroken plain, composed partly of gently-undulating expanses, partly of rich alluvial flats, partly of sandy tracts, and partly of extensive morasses. Its principal streams are the Vistula, the Niemen, and the Dwina, all belonging to the basin of the Baltic; and the Dniester, South Bug, and Dnieper, with its tributary, Pripet, belonging to the basin of the Black Sea. The physical configuration of the country makes it admirably adapted for agriculture. Next to grain and cattle its most important product is timber.

The Poles, like the Russians, are a Slavonic race, and are first spoken of as the Polani, a tribe or people between the Vistula and Oder. The country was divided into small communities until the reign of Mieczyslaw I (962–992) of the Piast dynasty, who renounced paganism in favor of Christianity, and was a vassal of the German emperor. He was succeeded by Boleslaw the Great (992–1025), who raised Poland into an independent kingdom and increased its territories. In succeeding reigns the country was involved in war with Germany, the heathen Prussians, the Teutonic Knights, and with Russia. The last of the Piast dynasty was Casimir the Great (1364–70), during whose reign the material prosperity of Poland greatly increased. He was succeeded by his nephew, Louis of Anjou, king of Hungary, whose daughter, Hedwig, was recognized as "king" in 1384, and having married Jagello, prince of Lithuania, thus established the dynasty of the Jagellons, which lasted from 1386 to 1572. During this period Poland attained its most powerful and flourishing condition. In 1572 the Jagellon dynasty became extinct in the male line, and the monarchy, hitherto elective in theory, now became so in fact. The more important of the elective kings were Sigismund III (1587–1637), Wladislaw or Ladislaus IV (1632–48), John Casimir (1648–69), and the Polish general Sobieski, who became king under the title of John III (1674–96). He was succeeded by Augustus II, elector of Saxony, who got entangled in the war of Russia with Charles XII, and had as a rival in the kingdom Stanislaus Leszynski. Augustus III (1733–63) followed, and by the end of his reign internal dissensions and other causes had brought the country into a state of helplessness. In 1772, under the last feeble king Stanislaus Augustus (1764–95), the first actual partition of Poland took place, when about a third of her territories were seized by Prussia, Austria, and Russia, the respective shares of the spoil being Prussia 13,415 sq. mi., Austria 27,000 sq. mi., and Russia 42,000 sq. mi. What remained to Poland was completely under Russian influence. Another partition in 1793 gave Russia nearly 97,000 sq. mi. and Prussia 22,500 sq. mi. A third partition took place in 1795 after the heroic attempt of Kosciusko to save his country, and the last king of Poland became a pensionary of the Russian court. The successive partitions gave Russia upward of 180,000 sq. mi., Austria about 45,000 sq. mi., and Prussia 57,000 sq. mi. From 1815 to 1830 Russian Poland was a constitutional monarchy with the emperor as king, but the Poles, taking occasion of the French Revolution, at the latter date rashly engaged in an insurrection, which only hastened their complete absorption in Russia. The name Kingdom of Poland indeed remains, but all the autonomic institutions of the country have been swept away, and the whole country is being rapidly Russified. The Polish language has been entirely superseded by Russian in all courts of law, educational establishments, and public offices; and all official correspondence must be in Russian. The population in 1885 was 7,960,304, of whom fully 71 per cent. were Roman Catholics.

The Polish language belongs to the Slavic division of the Aryan or Indo-European tongues. It is remarkable for its flexibility, richness, power, and harmony; its grammatical structure is fully developed and established, and its orthography is precise. The Polish literature reaches back to a more remote period than that of any other Slavonic language except the Bohemian. The oldest monuments consist of warlike, historical, political, and religious poems, more especially the last; but the Latin language, fostered by the church, was used exclusively by Polish writers for several centuries. The "golden age" of Polish literature was from 1521 to 1621. To this period belong Nicolas Rej (d. 1568) and Jan Kochanowski (d. 1584), who both attained eminence as poets, the former in satire, allegory, didactic poetry, etc., the latter as a lyrist of the highest rank. Among the other poets of the century were Szarzynski (d. 1581), and Szymonowicz (Simonides), author of *Polish Idyls*. It was in the sixteenth century also that the first histories in the language of the people were written. This flourishing period of Polish literature was followed by a period of Jesuit supremacy and literary decline, which lasted till about the middle of the eighteenth century. About that time the influence of the French civilization was widely felt in Poland, and prepared the way for the revival of letters. The most distinguished authors of the latter part of the eighteenth century are Naruszewicz, who wrote odes, idyls, satires, etc., and Krasicki (1734–1801), who also distinguished himself in various fields. Among modern Polish poets may be noted Mickiewicz (1798–1855), Krasinski (1812–59), Slowacki (1809–49), Zaleski (1802–86). Kraszewski, novelist and political and historical writer, is one of the most prolific of present-day Polish authors. Most departments of literature have been successfully cultivated by modern Polish writers, but comparatively few have attained a European reputation.

Polar Expeditions. See *North Polar Expeditions* and *South Polar Expeditions*.

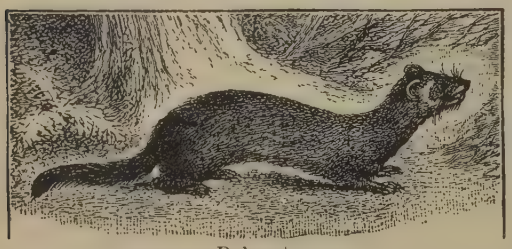
Polar'iscope, an optical instrument, various kinds of which have been contrived, for exhibiting the polarization of light, or for examining transparent media for the purpose of determining their polarizing power. The important portions of the instrument are the polarizing and analyzing plates or prisms, and these are formed either of natural crystalline structures, such as Iceland spar and tourmaline, or of a series of reflecting surfaces artificially joined together.

Polarization of Light, an alteration produced upon light by the action of certain bodies by which it is made to change its character. A common ray of light exhibits the same properties on all sides, but any reflected or refracted ray, or a ray transmitted through certain media, exhibits different properties on different sides, and is said to be polarized. The polarization of light may be effected in various ways, but chiefly in the following: 1, By reflection at a proper angle (the "polarizing angle") from the surfaces of transparent media, as glass, water, etc. 2, By transmission through crystals possessing the property of double refraction, as Iceland spar. 3, By transmission through a sufficient number of transparent uncrystallized plates placed at proper angles. 4, By transmission through a number of other bodies imperfectly crystallized, as agate, mother of pearl, etc. The knowledge of this singular property of light has afforded an explanation of some interesting phenomena in optics. The *plane of polarization* is that particular plane in which a ray of polarized light incident at the polarizing angle is most copiously reflected. When the polarization is produced by reflection the plane of reflection is the plane of polarization. According to Fresnel's theory, which is that generally received, the vibrations of light polarized in any plane are perpendicular to that plane. The vibrations of a ray reflected at the polarizing angle are accordingly to be regarded as perpendicular to the plane of incidence and reflection, and therefore as parallel to the reflecting surface. Polarized light cannot be distinguished from common light by the naked eye; and for all experiments in polarization two pieces of apparatus must be employed, one to produce polarization, and the other to show it. The former is called a *polarizer*, the latter an *analyzer;* and every apparatus that serves for one of these purposes will also serve for the other. The usual process in examining light with a view to test whether it is polarized, consists in looking at it through the analyzer, and observing whether any change of brightness occurs as the analyzer is rotated. There are two positions, differing by 180°, which give a minimum of light, and the two positions intermediate between these give a maximum of light. The extent of the changes thus observed is a measure of the completeness of the polarization of light. Very beautiful colors may be produced by the peculiar action of polarized light; as for example, if a piece of selenite (crystallized gypsum) about the thickness of paper is introduced between the polarizer and analyser of any polarizing arrangement, and turned about in different directions, it will in some positions appear brightly colored, the color being most decided when the analyzer is in either of the two critical positions which give respectively the greatest light and the greatest darkness. The color is changed to its complementary by rotating the analyzer through a right angle; but rotation of the selenite, when the analyzer is in either of the critical positions, merely alters the depth of the color without changing its tint, and in certain critical positions of the selenite there is a complete absence of color. A different class of appearances are presented when a plate, cut from a uniaxial crystal by sections perpendicular to the axis, is inserted between the polarizer and the analyzer. Instead of a broad sheet of uniform color, there is exhibited a system of colored rings, interrupted when the analyzer is in one of the two critical positions by a black or white cross. Observations of this phenomenon affords in many cases

an easy way of determining the position of the axis of the crystal, and is therefore a great service in the study of crystalline structure. Crystals are distinguished as dextro-gyrate or lævo-gyrate, according as their colors ascend by a right-handed or left-handed rotation of the analyzer horizontally. Glass in a state of strain exhibits coloration when placed between a polarizer and analyzer, and thus we can investigate the distribution of the strain through its substance. Unannealed glass is in a state of permanent strain. A plate of ordinary glass may be strained by a force applied to its edges by means of a screw. The state of strain may be varied during the examination of the plate by polarized light. A plate of quartz (a uniaxial crystal) cut at right angles to the optic axis exhibits, when placed between an analyzer and polarizer, a system of colored rings like any other uniaxial crystal; but we find that the center of the rings, instead of having a black cross, is brightly colored, red, yellow, green, blue, etc., according to the thickness of the plate.

Pole, the name given to either extremity of the axis round which the earth revolves. The northern one is called the *north pole*, and the southern the *south pole*. Each of these poles is 90° distant from every part of the equator. In astronomy, the name is given to each of the two points in which the axis of the earth is supposed to meet the sphere of the heavens, forming the fixed point about which the stars appear to revolve. In a wider sense a pole is a point on the surface of any sphere equally distant from every point of the circumference of a great circle of the sphere; or a point 90° distant from the plane of the great circle, and in a line passing perpendicularly through the center, called the axis. Thus the zenith and nadir are the *poles* of the horizon. So the *poles* of the ecliptic are two points of the sphere whose distance from the poles of the world is equal to the obliquity of the ecliptic, or they are 90° distant from every part of the ecliptic. *Pole*, in physics, is one of the points of a body at which its attractive or repulsive energy is concentrated, as the poles of a magnet, the north pole of a needle, the poles of a battery.

Polecat, a name common to several species of digitigrade carnivora of the weasel family.



Polecat.

The common polecat is found in most parts of America and Europe. Its body is about 17 in. long, and the tail 6 in. The color is dark brown. It is a nocturnal animal, sleeping during the day and searching for its prey at night. It is especially destructive to poultry, rabbits, and game, as pheasants, so that in Britain it is being rapidly exterminated by gamekeepers, farmers, and others. Frogs, toads, newts, and fish are often stored as food by this voracious animal. It has glands secreting a fetid liquor, somewhat like that of the American skunk, which it ejects when irritated or alarmed. The name of "Foumart" is also applied to the polecat; and its fur, which is imported in large quantities from Northern Europe, is known as that of the "Fitch." Its hairs form a superior kind of artists' brushes.

Pole Star, the star of the constellation Ursa Minor, situated about 1° 20′ from the north celestial pole, round which it thus describes a small circle. It is of the second magnitude, and is of great use to navigators in the northern hemisphere. Two stars called the pointers, in the constellation Ursa Major (the Great Bear, commonly called the Plow), always point in the direction of the pole star, and enable it to be found readily.

Police (po-lēs′), the system instituted by a community to maintain public order, liberty, and the security of life and property. In its most popular acceptation the *police* signifies the administration of the municipal laws and regulations of a city or incorporated town or borough. The primary object of the police system is the prevention of crime and the pursuit of offenders; but it is also subservient to other purposes, such as the suppression of mendicancy, the preservation of order, the removal of obstructions and nuisances, and the enforcing of those local and general laws which relate to the public health, order, safety and comfort. The term is also applied to the body of men by which the laws and regulations are enforced. A police force may be either open or secret. By an open police is meant officers dressed in their accustomed uniform, and known to everybody; while by a secret police is meant officers whom it may be difficult or impossible to distinguish from certain classes of citizens, whose dress and manners they may think it expedient to assume, in order that they may the more easily detect crimes or prevent the commission of such as require any previous combination or arrangement. This latter class of officer is termed in America and Great Britain, a *detective*.

In the U. S. each city has its own separate police administration. The organization of a uniformed municipal police is comparatively recent, even in the large cities; in New York it was not substituted for the inefficient night-watch until 1845. The present police organization of that city may be taken as representative of the American system generally. The department of police of the city of New York consists of a "board of police," comprising four commissioners appointed by the mayor, and the "police force" and officers appointed by the board. The city, with an area of 41½ sq. mi. and a pop. of 1,515,000, is divided into four inspection districts, which are subdivided into thirty-five precincts. At the head

of the force is a superintendent, under whom there are four inspectors, a captain over each precinct, sergeants, roundsmen (visiting officers), patrolmen (the body of the force), and doormen at the stations. There are also about a score of police surgeons. The general administration of the force is vested in the board of police, who make appointments, transfers, etc., hear charges against members of the force, and make rules and regulations for the discipline of the department. The orders, however, must not conflict with the constitution of the Union or of the state. The superintendent is the chief executive officer, and is appointed by the board, to whom he makes written quarterly reports; and he receives similar quarterly reports in writing from each of the inspectors. The captains report every morning to the central office. The roundsmen must see that the patrolmen are properly performing their duty, and the sergeants again are responsible for both roundsmen and patrolmen. Besides the general force, there are several "squads" organized for special duties. These include the "sanitary police company," whose members inspect buildings, premises, employments, ventilation, sewerage, etc., which are supposed to be dangerous to life or detrimental to health, report nuisances, and seize food unfit for consumption; officers of this company also act as school-board officers, and others, qualified as engineers, inspect steamboats and stationary steam boilers used for motive power in the city. The detective force is also a separate "squad;" and others are the mounted squad for duty near Central Park, the mounted patrol for rural precincts, the harbor police, the "ordinance squad" (for enforcing city ordinances), the Broadway squad (for aiding pedestrians in crossing during the day), special service squads, and others. On the board of police falls the duty of seeing that the streets are kept clean, and a bureau of street cleaning is appointed by the board to supervise this department. Another duty imposed upon the New York police relates to elections: all elections within the city are held under their direction; election officers are appointed by the board, to whom the returns are transmitted. In 1890 the police force of New York numbered 3,421 men, of whom 2,922 were patrolmen; this is one man to every 414 of the pop., and allows five patrolmen to every mile of street; the average annual cost of the force is $4,391,766. The police force of Chicago in the same year numbered 1,624 (including a general superintendent, one inspector, a chief of detectives, and ten captains), and cost $979,894; of Philadelphia 1,717, cost $1,000,000; of Brooklyn 1,157, cost $859,184; of St. Louis 613, cost $475,408; of Boston 916, cost $963,355; of Baltimore 782, cost $677,914; of San Francisco 406, cost $545,500 a year.

Polillo, one of the Philippine Islands, e. of Luzon; length 30 mi.; breadth 20 mi.

Polishing is the name given to the process by which the surface of a material is made to assume a perfectly smooth and glossy appearance, usually by friction. The article to be polished must first be made smooth and even, after which the polishing begins. In the case of wood the process is usually effected by rubbing with French polish. In metals, by polishing-steel or bloodstone, or by wood covered over with leather, and on which pulverized tripoli, chalk, tin-putty, etc., is sprinkled. In glass and precious stones, by tin-putty and lead siftings; in marble, by tin-putty and tripoli; in granite and other hard stones, by tripoli and quicklime.

Political Economy, the science of the social ordering of wealth, or the science which has as its aim the investigation of the social conditions regulating the production, distribution, exchange, and consumption of wealth, the term wealth being understood to mean all articles or products possessing value in exchange. While, however, political economy is susceptible of wide definition on these lines, the exact scope of the science within the terms of the definition has been the subject of much confused debate. From the nature of the actual conditions of the production and regulation of wealth, and the place of the systematic examination of these as departmental to a larger science investigating the natural laws of the formation and progress of civilized communities, it is impossible to sunder it entirely from the physical, intellectual, and moral considerations tending to enlarge indefinitely its scope. The varying extent to which these elements have entered into the treatment of the subject by economists has given rise to controversy not only as to whether economics is to be considered as a physico-mental or a purely mental science, but even as to its claim to be considered as an independent science at all. By most economists it is urged, that as the reasoned and systematic statement of a particular class of facts it may rightly claim to be considered as a science, while, as dealing with inanimate things only incidentally as the measure of motives of desire, it is to be classed with the moral or social sciences. Of more importance, as affecting the whole history of the science, have been the questions arising from the method employed in economic inquiry. The modern English school of economists, including the names of Adam Smith, Ricardo, Mill, Cairnes, Fawcett, and Marshall, have been mainly guided by the deductive method, its more extreme representatives, such as Senior, asserting this method to be the only one applicable to the science. In point of fact political economy has availed itself of both methods. It has been deductive in so far as it has assumed at the outset certain hypotheses, and derived from these by a dialectical process the guiding principles of the science; but even the older economists, working under the immediate influence of the mathematico-physical sciences chiefly, cannot be justly accused of having overlooked, though they tended to underestimate, the necessity of supplementing deduction by induction.

The hypothesis on which the economic system was founded, was that in the economic

sphere the principal motive of human action was individual self interest, leading men to seek to obtain the greatest amount of wealth with the least expenditure of effort; this hypothesis being followed out to its logical conclusions, under assumed conditions of perfectly free competition, in connection with the facts of the limitations of the earth's extent and productiveness, and the theory of a tendency in the race to multiply to an incalculable extent in the absence of natural or artificial obstacles. On this basis theories of value, rent, and population were formed, having the character of laws, but of laws which were hypothetical merely—true only under the assumed conditions of an environment in which competition was free and frictionless, unhampered by inertness, ignorance, restrictive customs, and the like. In this respect the method adopted and the results arrived at found analogy in those physical sciences the laws of which are only applicable in actual fact under large and variable modification. There was, however, an indisputable tendency among the earlier economic writers to regard these hypothetical laws as in a greater degree representative of actual fact than they were, and even, when the actual facts fell short of the theoretic conditions, to regard these as prescriptive and regulative. The ethical protest against this tendency found a strong support in the development of the group of biological sciences, opening up new conceptions of organic life and growth; and as the result of these and other influences the old rigidity in the application of theory has largely disappeared. Where the older economist tended to look upon the subject-matter of economics as more or less constant and furnishing laws of universal application, the modern economist, having regard to the complexity and variability of human motives and the development of the race both in the matter of character and institutions, has come to recognize that the abstract conception of a frictionless competitive atmosphere, in which self-interested motives worked with mechanical regularity, can never bear other than a qualified application to actual economic conditions, and that laws relating to the economic aspects of life at one stage of human development seldom apply at another without large modification. He realizes clearly what the older economists only imperfectly perceived, and even more imperfectly expressed, that the system they were elaborating was to be considered rather as an instrument to assist in the discovery of economic truth, than a body of truths representing any actual or desirable social state. When regarded in this light—as a means to assist in the disentanglement of the complex motives operative in actual economic relations—the isolation of one set of economic forces, and the tracing of the logical issues of these, becomes of the highest value, despite the danger in careless use of neglecting necessary modification and of translating its hypothetic statements into prescriptions for conduct and social organization

Political Economy

It has been this neglect, the assumption of didactic authority, and the extent of the modifications often necessary in the practical application of theory which have tended to bring the older school into discredit at the hands of Comte, Cliff Leslie, Ruskin, and a large number of foreign economists—some complaining with Comte of the tendency to vicious abstractions, and the impossibility of isolating to any useful end the special phenomena of economics from other social phenomena; some, like the German and American historic schools, arguing that it is desirable and necessary to reason direct from historic facts to facts without the intervention of any formal economic theory. So far, however, the opponents of the older method of dealing with economic problems, though they have accomplished an admirable work in clearing the older economics of many confusions and misapprehensions, have failed to supply a superior method of analyzing the phenomena constituting the subject-matter of the science, while many of them have not scrupled to avail themselves largely of the results arrived at by the method they condemn. On the grounds of difference in method, and in conception of the scope of the science, the economists of to-day may be classified as forming four principal groups:—

1. The modern orthodox philosophic school, working as indicated above, on the basis of a body of hypothetical principles, constituting the statics of exchange and distribution, deductively arrived at by the consideration of the operations of motives of self interest in an environment of free and frictionless competition—principles imperfectly representing actual economic conditions, but of assistance, under due precautions, in the accurate analysis of these.

2. A group of mathematical economists allied to the philosophic school as working on the deductive basis, and largely engaged in translating philosophic theory into symbolic formulæ for retranslation into theory.

3. The historical school, denying the value of deductive economics, and seeking to confine the work of the economist to the description of the various stages of economic civilization as they have risen, and the indication, under due conditions of time, place, and national development, of such relative principles as may be discoverable in them.

4. A group of economic students who approach political economy from the point of view of previous training in "the sciences of inorganic and vital nature" (physics and biology as opposed to metaphysics), and who wish to include within the scope of economics the consideration of wealth as measured, not by subjective emotions and desires, but by the objective utility of things, the part played by them in the maintenance and evolution of society, the definitely determinable capacities they may possess of supplying physical energy and of improving the physiological constitution of the race. From this point of view, economics is to be regarded as "the di-

rect study of the way in which society has actually addressed itself, and now addresses itself, to its own conservation and evolution through the supply of its material wants" (Ingram)—a study, therefore, inseparable from the study of sociology as a whole, and to be followed up under the immediate guidance or bias of a moral synthesis and a therapeutic aim.

The general scope of the science from the neo-orthodox standpoint may be broadly indicated under four heads:—

I. Production: dealing with the requisites of production—Land (natural agents), Labor, and Capital; the law of fertility of land (law of diminishing returns); the laws of growth of population and capital; the organization of industry, division of labor, etc.

II. The pure theory of values or theory of normal (natural) values, i. e., of values as they would arise in a market where competition was free and undisturbed. Under this head are discussed the relations of value and utility; the laws of supply and demand; cost and expenses of production; the law of rent and the relation of rent to value; the considerations determining the normal share of the various classes of producers in the value of the product; the laws of supply and demand in relation to skilled and unskilled labor and to capital; the laws of wages and earnings, etc.

III. The application of the pure theory of values under the conditions of actual trade — internal and international; treating of the medium of exchange; the influence of changes in the purchasing power of money; influence of modern credit systems; the influence upon prices and wages and profits of local customs, monopolies, combinations, trades unions, co-operation, etc.; the conditions of foreign exchange; the competition of different countries in the same market, and the like.

IV. The economic functions and influence of government: dealing with Taxation, direct and indirect; the opposing principles of Protection and Laisser-faire, etc.

In the last division the treatment inevitably takes the form not merely of setting forth what is, but of discussing what ought to be; in other words, the method is no longer that of a science aiming at the systematized representation of facts, but rather that of an art, seeking to prescribe and regulate for ethical and prudential reasons the industries and commerce of nations. In this respect a large portion of the discussions usually ranged under this head might well be considered as forming with certain other pressing problems of economic reform a distinct branch of the subject, which may be provisionally described as prescriptive or regulative or therapeutic economics. To this branch would belong the various problems touching the fair share of the different productive classes in the value of the product, and indeed the investigation of the whole question of property in relation to the various schemes of distribution — individualistic, socialistic, and communistic. The frequent mixture of these considerations of practical economic reform with the non-moral and indifferent systematization of contemporary economic fact has been a most fertile source of confusion and misunderstanding.

Political Economy

As a separate scheme of knowledge meriting the title of a science, political economy is little more than a century old, but the germs of modern economic doctrines are to be traced long previous. In Greece, Plato, Xenophon, and Aristotle alike conducted investigations in economics from an ethical point of view and in subordination to the theory of the state, the last, however, showing a perception of the difference between value in use and value in exchange, of the advantages of division of labor, of the functions of money as a measure of value and an instrument of exchange, of the desirability of maintaining a proportion between population and territory. The Romans followed, without advancing upon, the economics of the Greeks. Cicero opposed manufactures and trade, upholding, in the main, like Cato and Varro, an agrarian ideal; Pliny condemned the effects of servile labor and the exportation of money, and discussed some of the problems connected with value. After the fall of Rome it is not till the latter part of the Middle Ages that we find the emancipation of the towns and the development of the burgher class admitting of industry and commerce on a wide scale. In the thirteenth century St. Thomas Aquinas paraphrased the doctrines of Aristotle on money and interest, establishing on them a condemnation of interest. His influence lasted into the next century, among the principal writers of which were Bartolo di Sassoferrato, Jean Buridan, and Nicholas Oresme, the latter the author of the fullest treatise on money written up till his time. Gabriel Biel, F. Patrizzii, and Diomede Caraffa are the chief names of the fifteenth century, the study of economics being chiefly pursued by ecclesiastics until the collapse of mediævalism in the sixteenth century. The main economic topics continued to be the nature and functions of money, the legitimacy of usury, institutions of credit, and monti di pietà. Chief among the sixteenth century writers are the names of Jean Bodin in France, and in England the writer W. S. (probably William Stafford), who worked in part from Bodin, Sir Walter Raleigh, Gilbert, Hackluyt, and Peckham. The characteristic doctrines developed at this time came to be known as the mercantile system, or Colbertism, and found expression in the close of the sixteenth and beginning of the seventeenth centuries chiefly in the writings of Antonio Serra in Italy, Antoine de Montchrétien in France, and Thomas Mun in England. They were opposed by a few early advocates of free trade, including Emérique de Lacroix in France, and Alberto Struzzi in Spain. In the second half of the seventeenth century considerable advances were made by Hobbes, Locke, Sir Joshua Child, Sir William Petty, and Sir Dudley North, and the foundation of the Bank of England gave rise to much controversy early in the eighteenth century, leading to more enlarged

conceptions of the operations of credit. In France, Boisguillebert and Vauban opposed Colbertism, and Montesquieu endeavored to work out the economics of government finance. The foundation of the physiocratic school by Quesnay was, however, the chief economic movement of the eighteenth century in France, among its exponents being the elder Mirabeau, De la Rivière, Baudeau, Le Trosne, Dupont de Nemours, Gournay, and especially Turgot, the greatest of the group. It made some little way in Italy and Germany; but its direct influence was not marked in England, where Hume's *Economic Essays* were followed by Adam Smith's epoch-making *Wealth of Nations*, directed against mercantilists and physiocrats alike. New elements were introduced by the population theory of Malthus, and the theory of rent enunciated by Ricardo on the lines indicated by Anderson and West; and the statistical side was developed by Thomas Tooke. In reducing the teaching of Adam Smith to system, the French economist Say played an influential part, and the work was advanced still further by the labors of Torrens, James Mill, M'Culloch, Whately, Senior, and other minor writers. No work, however, after the *Wealth of Nations* exercised so wide an influence as that of John Stuart Mill, who, despite the signs of revolt, to which allusion has been made, still dominates popular economic thought for good and ill. The names of Longe, Leslie, Thornton, and Cairnes may be noted among the earlier critics or commentators of Mill; while Marshall, working on the basis of Mill, has more accurately defined the limitations of the deductive method in seeking to formulate and apply a pure theory of values. Among other recent writers of importance have been W. Stanley Jevons (mathematical and statistical group), Carl Marx (Socialist), Roscher (historical), Sidgwick (eclectic), L. G. Ely, and F. A. Walker.

Political Offenses are those offenses considered injurious to the safety of the state, or such crimes as form a violation of the allegiance due by a subject to the recognized supreme authority of his country. In modern times the crimes considered political offenses have varied at different periods and in different states. The most serious political offenses are termed treason, and those of a lighter nature, which do not aim at direct and open violence against the laws, but which excite a turbulent and discontented spirit which would likely produce violence, are termed sedition. In the U. S., and in most of the countries of Europe, the extradition treaties do not include the giving up of political offenders.

Political Parties in the U. S.—The first distinctive political division in this country during the period of the Revolution was that occasioned by the agitation preceding the Continental Congress which met in Philadelphia Sept. 5, 1774, and remained in session with closed doors for six weeks. The members of this congress called themselves Colonial Whigs, and adopted a non-importation, non-exportation, and non-consumption agreement, binding on the colonies, and addressed a petition to the king of England and the people of Great Britain, in which it hoped to be supported by the great mass of the patriots of the colonies. The great struggle which followed in a measure obliterated the issues which the Colonial Whigs had sprung, but as soon as peace was declared a strong party arose which was actuated by the dread of a centralized power, in opposition to the views in favor of a "strong government" expressed by Hamilton, Adams, Jay, and others, the former being termed Democrats, or Democratic Republicans, and the latter Federalists. The agitation of the questions connected with this issue resulted in the calling of a Constitutional Convention, which met in Philadelphia in 1787, presided over by General Washington. Hamilton, the leading Federalist in the country, was mainly instrumental in calling this convention together, and his views prevailed in the instrument put forth to such an extent that the anti-Federals began an agitation for amending the Constitution, and an extra session of Congress was called, at which ten amendments were made to it, embodying freedom of speech and of the press, together with religious liberty, to all of which principles the Federals were presumed to be adverse. The Federals were in favor of Congress assuming the state debts incurred during the Revolutionary War, and the passage of that measure in 1789 exasperated the Republicans beyond measure. The next issue between the parties was the chartering by Congress of a United States Bank, with a capital of $10,000,000, which was violently opposed by the Republicans. The anti-Federal party manifested its feeling in favoring a union with France in her war with England, which the second administration of Washington, under federal influences, strongly and wisely opposed. The election of the succeeding administration, that of Jefferson, was a complete triumph of the Republican party, of which Jefferson was the especial apostle.

During Madison's administrations the Democratic clubs made their appearance, opposing the action of the Republican majority in Congress in its hostile action toward France. About this time the Federals succeeded in passing through Congress a bill which proved to be so unpopular as to ring the death knell of their party. It was called the Alien and Sedition act. It gave the president power to banish from the country any one whom he considered dangerous to the public peace, or to fine and imprison such persons as he should suppose to be guilty of conspiring together to oppose any measure of the government. The Republicans not long afterward passed the Virginia and Kentucky resolutions, which went to the opposite extreme of radicalism. It may be mentioned that Hamilton himself had little sympathy with republican institutions. Hildreth, the historian, says that "in private conversation he did not disguise his opinion that to save her liberties from attack or intestine commotions, America might yet be driven into serious alterations of her constitution, giving

to it more of a monarchical and aristocratic cast."

The Republicans had gained strength and influence under Jefferson's two administrations. They now began to call themselves Democratic Republicans, or Republican Democrats, and one of their especial tenets was in sympathy with France as against England; and it constituted one of the most difficult tasks of Jefferson's administration to prevent the strong feeling everywhere prevalent against England from drawing the country into a war with her.

Ever since the organization of the constitutional government in 1787 the country had been divided between strict and loose or liberal constructionists of the Constitution, and the latter embraced the advocates of a U. S. bank, a protective tariff, and internal improvements. The anti-Federalists or Republicans had from the first objected to these measures on the ground that the Constitution authorized no such assumption of authority on the part of the government, while their opponents held to the largest discretionary power on the part of the executive in such matters. The first sharp issue in this respect was the memorable struggle concerning the removal of the deposits from the U. S. Bank by order of President Jackson, who had been elected as the Democratic president, the name Republican having been dropped. From this time on, the opposition was known as the Whig party, and under the lead of Henry Clay was pronounced in its advocacy of internal improvements and a protective tariff. The Free-Soil party arose with the nomination of Martin Van Buren as a bolting Democratic candidate against Lewis Cass in 1848. In 1856, as a result of the agitation over the repeal of the Missouri Compromise, the Republican party sprang into existence from the remnants of the old Whig and the Free-Soil parties, and nominated John C. Fremont for president. A portion of the Whigs who refused to join the coalition nominated Millard Fillmore for president, and were known as Silver Grays. The term Old Hunkers, Woolly Heads, Barnburners, etc., had more especially a local application, having reference to the divisions of the Democratic and Whig parties in the state of New York.

Just preceding the Civil War, the issue of state rights became very prominent and incisive, and its persistent agitation contributed largely toward bringing on the great national conflict. The leaders of the old Democratic party in the South urged the extremest views on the rights of the states, embracing that of secession, which the new Republican party strenuously opposed. The election of Lincoln in 1860 was considered a *casus belli*, embodying all the leading principles against which the South had for years vehemently protested. The Republican party upon coming into power, proceeded to put down the rebellion, and to enact a strong protective tariff. After the war was closed it completed the work of reconstruction, and resumed specie payments which had been suspended during the progress of the war. Since the conclusion of the war the Democratic party has twice come into power — once by the election of Grover Cleveland in 1884, and again by his re-election in 1892.

The Greenback party, which opposed the measure for resumption of specie payments, was organized in 1874. Following this came the Labor party, which in 1891 merged into the People's party. In 1896 this party took the name of Populists, and merged with those republicans and democrats who favored the free coinage of silver on the basis of the value of gold to silver of 16 to 1. The same issue was raised again in 1900. The Republicans were successful in each of these elections.

Polk, James Knox (1795–1849), eleventh president of the United States; born in Mecklenburg co., N. C., Nov. 2, 1795; educated in the University of North Carolina. He was admitted to the bar in 1820, at Nashville, Tenn., to which state his parents had removed in 1806. In 1823, he was elected to the legislature, and was representative in Congress from 1823 to 1839. He was elected Speaker of the House in 1835 and re-elected in 1837. In 1840, he became governor of Tennessee, but was defeated in the election of 1841. Mr. Polk was an able lawyer and a forceful public speaker. He was a strenuous opponent of internal improvements, a protective tariff and a national bank, and a strong advocate of the annexation of Texas. His position on the Texas question secured for him the Democratic nomination for president in 1844. At the election he received 170 electoral votes to 105 for Henry Clay, the Whig candidate. Polk was inaugurated March 4, 1845, and formed a strong cabinet, composed of such men as Buchanan for the State Department, R. J. Walker for the Treasury, Marcy for the War Department, and the historian Bancroft for the Navy. His administration is memorable for several important events. The first of these was the Mexican war, which gave the U. S. a large accession of territory. The others were the adoption of the law tariff of 1842, the establishment of an independent treasury, the creation of the department of the interior and the settlement of the Oregon boundary. Mr. Polk died June 15, 1849.

Pollen, the male element in flowering plants; the fine dust or powder which by contact with the stigma effects the fecundation of the seeds. To the naked eye it appears to be a very fine powder, and is usually enclosed in the cells of the anther; but when examined with the microscope it is found to consist of hollow cases, usually spheroidal, filled with a fluid in which are suspended drops of oil from the 20,000th to the 30,000th of an inch in diameter, and grains of starch five or six times as large. Impregnation is brought about by means of tubes (pollen tubes) which issue from the pollen grains, adhering to the stigma, and penetrate through the tissues until they reach the ovary.

Pollok, Robert (1799–1827), a Scottish poet, was b. at Muirhouse, in the parish of Eaglesham, Renfrewshire. He was educated at Glasgow University, studied divinity, and was licensed as a preacher in 1827. He is the author

of a series of *Tales of the Covenanters*, and a blank-verse poem, *The Course of Time*, which in spite of many faults has enjoyed a wonderful popularity.

Poll Tax.—In the U. S. most states impose a poll tax or capitation tax as a condition of the suffrage; the sum being generally $1, but in some states only 50 cents, and in others varying from year to year, but not exceeding $3. A considerable number have no such tax; in others the imposition of a poll tax is expressly prohibited by the constitution.

Polo, a game at ball resembling hockey. The players are mounted on ponies, and wield a "mallet" 4 ft. 4 in. in length (a stick with a crook at the end). It is played by sides, and the object is to drive the ball from the center of the ground through either of the goals, the side gaining the most goals being the winner.

Polo, MARCO (1256–1323), Venetian traveler. His father Nicolo was the son of Andrea Polo, a patrician of Venice. Shortly before Marco's birth, Nicolo with his brother Matteo set out on a mercantile expedition, and ultimately arrived at Kemenfu, on the frontiers of China, where they were favorably received by Kubilai, the grand khan of the Mongols. In 1266 the khan sent the brothers on a mission to the pope, and they arrived in Venice in 1269. Two years later they again set out for the East, this time accompanied by the young Marco. After reaching the court of Kubilai, Marco rapidly learned the language and customs of the Mongols, and became a favorite with the khan, who employed him on various missions to the neighboring princes. Soon afterward he was made governor of Yang-tchou, in Eastern China, an appointment he held for three years. In 1292 the three Polos accompanied an escort of a Mongolian princess to Persia. After arriving at Teheran they heard of Kubilai's death, and resolved to return home. They reached Venice in 1295. In the following year Marco Polo took part in the naval battle of Curzola, in which he was taken prisoner. During his captivity he dictated to a fellow prisoner, Rustichello or Rusticiano of Pisa, an account of all his travels, which was finished in 1298. After his liberation he returned to Venice, where he died. His book—known as the *Book of Marco Polo*—created an immense sensation among the scholars of his time, and was regarded by many as pure fiction. It made known to Europeans the existence of many nations of which they were formerly totally ignorant, and created a passion for voyages of discovery. It has gone through numerous editions in the various European languages, but the best is that of Colonel (Sir Henry) Yule, accompanied with a great amount of learned elucidation and illustration. It was originally written in French, but Latin and Italian MSS. of it are more common.

Polta'va (or Pultawa), a government of Russia, bounded by Czernigov, Kharkov, Ekaterinoslav, Kherson, and Kiev; area 19,265 sq. mi. It consists of an extensive and somewhat monotonous flat, watered by several tributaries of the Dnieper. It is one of the most fertile and best cultivated portions of the Russian Empire, and grows large quantities of grain. Live stock and bee rearing are important branches of the rural economy. Both manufactures and trade are of very limited extent. Education is very neglected. Pop. 2,520,887. Poltava, the capital, at the confluence of the Poltava with the Worskla, has straight and broad streets, a cathedral, important educational institutions, etc. As a place of trade Poltava derives importance from the great fair held on July 20 each year. Wool is the great staple of trade. Horses, cattle, and sheep are likewise bought and sold in great numbers. It contains a monument to Peter the Great, who here defeated Charles XII in 1709. Pop. 41,250.

Polyb'ius (204–122 B.C.), a Greek historian, was b. at Megalopolis, in Arcadia. Educated for arms and political life he entered, at the age of twenty-four years, into the military and political service of the League. After the subjugation of Perseus, king of Macedonia, by the Romans (168), Polybius found himself among the 1,000 Achæans summoned to Rome to answer before the senate why the League had not aided the Roman army in Macedonia. While in Italy he formed an intimate friendship with Scipio Æmilianus, whom he accompanied on his African campaign, and witnessed the destruction of Carthage. He returned to Greece in 146, just after the fall of Corinth, and exerted himself successfully to obtain moderate terms from the Romans for his countrymen. His principal work is his history of Rome.

Pol'ychromy, the name given to the art of decorating works of sculpture and architecture with different colors. The custom of painting statues is as ancient as sculpture itself; the Egyptians, Assyrians, Phœnicians, Babylonians, and Persians all painted their statues in various colors, especially in red. Polychromy, however, only reached the dignity of a real art among the Greeks. Instead of employing colors, the sculptors of the age of Pericles generally used marbles of different colors fitted together, and the ornaments of their statues were made of various metals and of ivory. Thus the nude parts were, in some cases, of Parian marble, the draperies of streaked onyx, the eyes of gold or ivory, the shields and other arms of bronze, etc. Architectural polychromy may be divided into natural polychromy, in which the materials employed produce certain effects by their natural colors; and artificial polychromy, which is simply the application of coats of paint, whether on the exterior or interior parts of the edifice. Both natural and artificial polychromy were used by the Egyptians, Assyrians, Babylonians, and Persians. Polychromy was cultivated by the Romans in a much more restricted style. In the public buildings of the later Romans gold decorations and facings of variegated stone were used instead of mere colors. In the Middle Ages polychrome architecture was adopted by the Arabs and Byzantines. A fine example of Byzantine archi-

tecture in polychrome style is the Palatine Chapel at Palermo, erected in 1232. On the establishment of Gothic architecture polychromy was introduced into the interior of churches. This practise was maintained throughout the Middle Ages.

Polyc'ratēs, Greek tyrant or absolute ruler of Samos during the time of the elder Cyrus. He made himself master of the island by violence, and having secured absolute sway seized upon several of the neighboring islands and some towns upon the mainland. In 522 B.C. the Persian satrap Oroetes treacherously invited Polycrates to his palace, and there crucified him. Polycrates seems to have had much taste for learning and the arts, and greatly promoted the refinement of the Samians.

Polyg'amy consists in a man's having more than one wife at the same time. In ancient times polygamy was practised by all the Eastern nations, and was sanctioned or at least tolerated by their religions. It was permitted to some extent among the Greeks, but entirely disappeared with the later development of Greek civilization. To the ancient Romans and Germanic races it was unknown. It prevailed among the Jewish patriarchs both before and under the Mosaic law. But in the New Testament we meet with no trace of it. Polygamy has never been tolerated among Christians, although the New Testament contains no injunction against it. It is, however, practised by the Mohammedans.

Polyhym'nia (or Polym'nia), among the Greeks, the muse of the sublime hymn, and according to some of the poets, inventress of the lyre, and of mimes. She is usually represented in art as covered with a white mantle, in a meditative attitude, and without any attribute.

Polyne'sia, a general name for a number of distinct archipelagoes of small islands scattered over the Pacific Ocean, the Philippines, New Guinea, Australia, and New Zealand being excluded. The islands are distributed into numerous groups, having a general direction from n.w. to s.e. The groups north of the equator are the Pelew, Ladrone or Marianne, Caroline, Marshall, Gilbert or Kingsmill, Fanning, and Hawaii or the Sandwich Islands. South of the equator are New Ireland, New Britain, Solomon Islands, New Hebrides, Fiji, New Caledonia, Navigator, Friendly, Cook's or Harvey, and the Society Islands, the Low Archipelago, the Marquesas Islands, and the isolated Easter Island. The term Polynesia is sometimes restricted to the groups most centrally situated in the Pacific; the New Hebrides, Solomon Islands, New Britain, New Ireland (Bismarck Archipelago), etc., being classed together as Melanesia, whereas the Carolines, Ladrones, Marshall Islands, etc., form Micronesia. The islands may be divided into two chief classes, volcanic and coral islands. Some of the former rise to a great height, the highest peak in the Pacific, Mauna Kea, in Hawaii, reaching 13,895 ft. The principal groups of these are the Friendly, the Sandwich, the Marquesas, and the Navigator Islands. The coral islands comprise the Carolines, Gilbert, and Marshall Islands on the northwest, and the Society Islands and Low Archipelago in the southeast, in both of which groups the *atoll* formation is very common, besides numerous other groups where coral reefs occur. The elevations of these groups do not exceed 500 ft. Polynesia has a comparatively moderate temperature, and the climate is delightful and salubrious. The predominating race, occupying the central and eastern portion of Polynesia, is of Malay origin, with oval faces, wide nostrils, and large ears. The hair and complexion vary greatly, but the latter is often a light brown. Their language is split up into numerous dialects. The other leading race is of negroid or Papuan origin, with negro-like features and crisp mop-like hair. They are confined to Western Polynesia, and speak a different language, with numerous distinct dialects. Christianity has been introduced into a great many of the islands, and a large number of them are under the control of one or other of the European powers. Many atrocities have been practised on the natives in recent times in connection with the luring or kidnapping of them to work in the European settlements. The commercial products consist chiefly of cocoanuts, cotton, coffee, sugar, fruits, pearls, and trepang. The Ladrones were discovered by Magellan in 1521, the Marquesas by Mendaña in 1595, but it was not until 1767 that Wallis, and subsequently Cook, explored and described the chief islands. Since the natives came in contact with the whites their numbers have greatly decreased. For further information see articles on the individual groups and islands.

Polyphe'mus, in Greek mythology, the most famous of the Cyclops, who is described as a cannibal giant with one eye in his forehead, living alone in a cave of Mount Ætna and feeding his flocks on that mountain. Ulysses and his companions having been driven upon the shore by a storm, unwarily took refuge in his cave. Polyphemus, when he returned home at night, shut up the mouth of the cavern with a large stone, and by the next morning had eaten four of the strangers, after which he drove out his flocks to pasture, and shut in the unhappy captives. Ulysses then contrived a plan for their escape. He intoxicated the monster with wine, and as soon as he fell asleep, bored out his one eye with the blazing end of a stake. He then tied himself and his companions under the bellies of the sheep, in which manner they passed safely out in the morning. Polyphemus was the despised lover of the nymph Galatea.

Polythe'ism, the belief in, and worship of, a plurality of gods; opposed to monotheism, the belief in, and worship of one god. It is still a matter of debate whether polytheism is a primary form of human belief, or a degeneration of an original monotheistic idea. It is argued, on the one hand, that the sense of personal dependence, the feeling that there was an

undefined power, a mysterious *something* around and above him, did not primarily present itself to the mind of man except under a form of unity. His earliest religion would therefore be of a monotheistic character, but of a highly unstable nature, and eminently liable, among races of rude faculties and little power of abstraction, to assume a polytheistic form, the idea of one Supreme Being being readily obscured by the multiplicity of the visible operations of that being on earth. Those who affirm that polytheism was a primary form of religious belief, argue that man, ignorant of the nature of his own life, and of the nature, origin, and properties of other objects, could at first only attribute vaguely to all visible things the same kind of conscious existence as that which belonged to himself. Thus the sun, moon, and stars would all be living beings; and their influence, from the absence of any idea of a natural order, would be seen in the working of the material world, and in all the accidents of human life. As being beyond human control, and as affecting the condition of men, they would be loved or feared; and with the growth of the idea that they might be propitiated or appeased the system of polytheism would be complete.

Pombal (poṇ'bȧl), SEBASTIAO JOSÉ CARVALHO, MARQUIS OF (1699-1782), a Portuguese diplomat and statesman. After serving his government six years as envoy extraordinary to London, he was sent in the same capacity to Vienna, where he gained such favor with King Joseph that he was appointed minister of foreign affairs. He succeeded in regaining for the crown a great number of provinces which had become alienated, reorganized the army, sent colonists to Portuguese settlements, introduced into Brazil the cultivation of coffee, sugar, cotton, indigo, rice and cacao, and freed the Indians from slavery. Always an enemy to the Jesuits, he for years persecuted them and finally led the King to issue a decree banishing them from the kingdom. At the accession of Maria, Pombal fell from favor and retired to his castle.

Pomegranate (pom'gra-nāt), a dense spiny shrub, from 8 to 20 ft. high, supposed to have

Pomegranate.

belonged originally to the north of Africa, and subsequently introduced into Italy. The leaves are opposite, lanceolate, entire, and smooth; the flowers are large and of a brilliant red; the fruit is as large as an orange, having a hard rind filled with a soft pulp and numerous red seeds. The pulp is more or less acid and slightly astringent. The pomegranate is extensively cultivated throughout Southern Europe, and sometimes attains a great size. Another species inhabits the West Indies and Guiana.

Pomera'nia, a province of Prussia, bounded by the Baltic, Mecklenburg, Brandenburg, and West Prussia; area 11,622 sq. mi. The coast is low and sandy and lined by numerous lagoons. The chief islands along the coast are Rügen, Usedom, and Wollin. The interior is flat and in parts, marshy. The principal rivers are the Oder, Persante, and Stolpe. The soil is generally sandy and indifferent, but there are some rich alluvial tracts, producing a quantity of grain. Flax, hemp, and tobacco are also cultivated. Domestic animals are numerous. The forests are of large extent. Fish is abundant. There are few minerals. Manufactures include woolen and other fabrics. A considerable general and transit trade is carried on. The center of trade is Stettin, which ranks as one of the chief commercial cities of Prussia. Pomerania appears to have been originally inhabited by Goths, Vandals, and Slavs. The first mention of it in history is in 1140. It long remained an independent duchy, and in 1637, on the extinction of the ducal family, it was annexed to Sweden. On the death of Charles XII it was ceded to the electoral house of Brandenburg, with the exception of a part which subsequently was also obtained by Prussia. For administrative purposes it is divided into three governments, Stettin, Köslin, and Stralsund. Pop. 1,505,575.

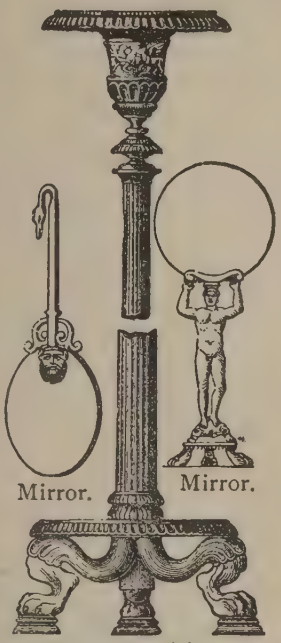
Pomeroy, Meigs co., O., on Ohio River, 220 mi. n. of Cincinnati. Railroads: C. H. V. & T.; K. & M.; and Ohio River. Industries: iron and steel co., two flouring mills, iron foundry, four salt works, and a large furniture factory. Oil and natural gas undeveloped. Surrounding country agricultural. The town was first settled in 1816 and became a city in 1840. Pop. 1900, 4,639.

Pomo'na, among the Romans, the goddess of fruit, and wife of Vertumnus. At Rome she was usually represented with a basket of fruit, or with fruit in her bosom.

Pomo'na, or mainland, the largest and most populous of the Orkney Islands; length from n.w. to s.e., 23 mi.; extreme breadth about 15 mi., but at the town of Kirkwall only about 2½ mi.; area 150 sq. mi.; pop. 17,465.

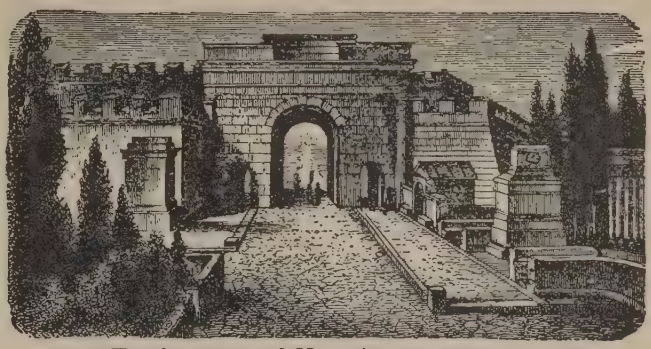
Pompeii (pom-pā'yī), an ancient city of Italy, in Campania, near the Bay of Naples, about 12 mi. s.e. from the city of that name, and at the base of Mount Vesuvius on its southern side. Before the close of the republic, and under the early emperors, Pompeii became a favorite retreat of wealthy Romans. In A.D. 63 a fearful earthquake occurred, which destroyed a great part of the town. The work of rebuilding was soon commenced, and the new town had a population of some 30,000 when it was overtaken by another catastrophe on Aug. 24, A.D. 79. This consisted in an eruption of Mount Vesu-

Lamp.

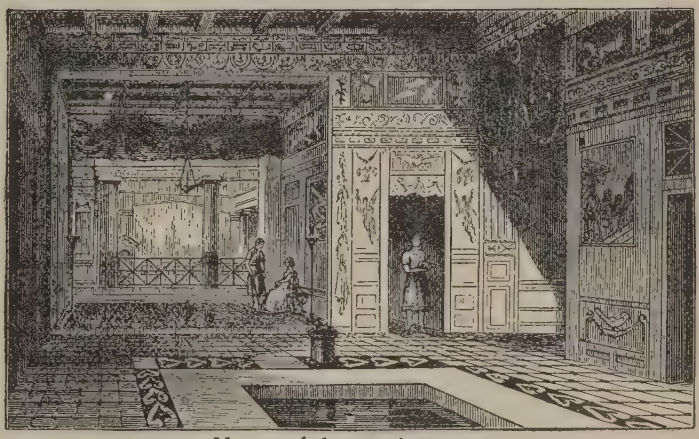


Mirror. Mirror.

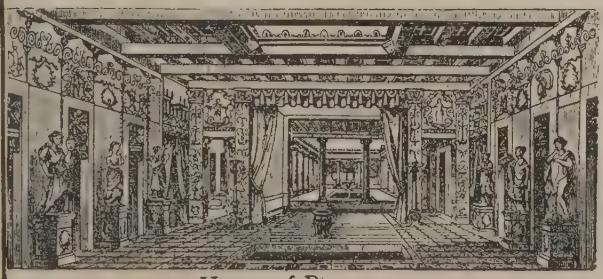
Candle-stick.



Tomb-street and Herculaneum gate.

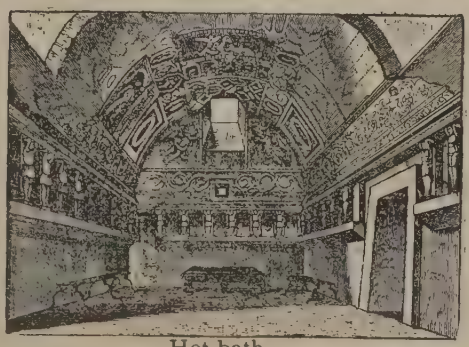


House of the tragic poet.



House of Pansa.

Bronze ornament.



Hot bath.

Principal gate.

vius, which suddenly belched forth tremendous showers of ashes, red-hot pumice stone, etc., so as to overwhelm the city to a considerable depth. The present superincumbent mass is about 20 ft. in thickness. A portion of this was formed by subsequent eruptions, but the town had been buried by the first catastrophe and entirely lost to view. Pompeii was consigned to oblivion during the Middle Ages, and it was not until 1748, when a peasant in sinking a well discovered a painted chamber with statues and other objects of antiquity, that anything like a real interest in the locality was excited. Excavations were now prosecuted, and in 1755 the amphitheater, theater, and other parts were cleared out. Under the Bourbons the excavations were carried out on a very unsatisfactory plan. Statues and articles of value alone were extricated, while the buildings were suffered to fall into decay or covered up again. To the short reign of Murat (1808–15) we are indebted for the excavation of the Forum, the town walls, the Street of Tombs, and many private houses. Latterly the government of Victor Emmanuel assigned $12,500 annually for the prosecution of the excavations, and a regular plan has been adopted, according to which the ruins are systematically explored and carefully preserved. The town is built in the form of an irregular oval extending from east to west. The circumference of the walls amounts to 2,925 yds. The area within the walls is estimated at 160 acres; greatest length, ¾ mi.; greatest breadth, ½ mi. There are eight gates. The streets are straight and narrow and paved with large polygonal blocks of lava. The houses are slightly constructed of concrete, or occasionally of bricks. Numerous staircases prove that the houses were of two or three stories. The ground floor of the larger houses was generally occupied by shops. Most of the larger houses are entered from the street by a narrow passage leading to an internal hall which provided the surrounding chambers with light and was the medium of communication; beyond the latter is another large public apartment termed the *tabulinum*. The other portion of the house comprised the private rooms of the family. All the apartments are small. The shops were small and all of one character, having the business part in front and one or two small chambers behind, with a single large opening serving for both door and window. The chief public buildings are the so-called Temple of Jupiter, the Temple of Venus, the Basilica, the Temple of Mercury, the Curia, and the Pantheon or Temple of Augustus. There are several interesting private buildings scattered through the town, including the villa of Diomedes, the house of Sallust, the house of Marcus Lucretius. The Museum of Naples owes many of its most interesting features to the ornaments, etc., found in the public and private edifices above mentioned.

Pompey, in full, CNEIUS POMPEIUS MAGNUS (106–48 B. C.), a distinguished Roman. In B.C. 89 he served with distinction under his father in the war against the Italian allies. In the struggle between Marius and Sulla, Pompey raised three legions to aid the latter, and regained all the territories of Africa which had forsaken the interest of Sulla. This success excited the jealousy of Sulla, who recalled him to Rome. On his return Sulla greeted him with the surname of Magnus (Great). Pompey demanded a triumph, to which Sulla reluctantly consented. He entered Rome in triumph in September, 81, and was the first Roman permitted to do so without possessing a higher dignity than that of equestrian rank. After the death of Sulla, Pompey put an end to the war which the revolt of Sertorius in Spain had occasioned, and in 71 obtained a second triumph. In this year, although not of legal age and without official experience, he was elected consul with Crassus. In 67 he cleared the Mediterranean of pirates, and destroyed their strongholds on the coast of Cilicia. In the four years, 65–62, he conquered Mithridates, Tigranes, and Antiochus, king of Syria. At the same time he subdued the Jews and took Jerusalem by storm. He returned to Italy in 62 and disbanded his army, but did not enter Rome until the following year, when he was honored with a third triumph. Pompey, in order to strengthen his position, united his interest with that of Cæsar and Crassus, and thus formed the first triumvirate. This agreement was concluded by the marriage of Pompey with Cæsar's daughter Julia; but the powerful confederacy was soon broken. During Cæsar's absence in Gaul Pompey ingratiated himself with the senate, was appointed sole consul, and the most important state offices were filled with Cæsar's enemies. Through his influence Cæsar was proclaimed an enemy to the state, and his rival was appointed general of the army of the republic. Cæsar crossed the Rubicon in 49 (see *Cæsar*), and in sixty days was master of Italy without striking a blow. Pompey crossed over to Greece, and in this country, on the plains of Pharsalia, occurred the decisive battle which made Cæsar master of the Rome world. Pompey fled to Egypt, where he hoped to find a safe asylum. The ministers of Ptolemy betrayed him, and he was stabbed on landing by one of his former centurions.

Ponce de Leon (pon'the de le-on'), JUAN (1460–1521), one of the early Spanish discoverers in America. He accompanied Columbus on his second expedition in 1493, and was sent by Ovando to conquer the island of Porto Rico. Having there amassed great wealth, and received information of an island situated to the north, he discovered the country, to which he gave the name of Florida. Ponce returned to Spain in 1513, and was appointed by Ferdinand governor of the island of Florida, as he called it, on condition that he should colonize it. In 1521 he embarked nearly all his wealth in two ships, and proceeded to take possession of his province. He was, however, met with determined hostility by the natives, who made a sudden attack upon the Spaniards and drove them to their ships. In the combat Ponce de Leon was mortally wounded.

Poncho (pon'chō), a kind of cloak much worn by the South American Indians, and also by many of the Spanish inhabitants. It is a piece of thick woolen cloth of rectangular form, from 5 to 7 ft. long and 3 to 4 ft. broad, with a hole in the center for the head to pass through.

Pondicherry, a town, capital of the French East Indian settlement of the same name, on the east or Coromandel coast, 85 mi. south by west from Madras. Area 115 sq. mi.; pop. 140,-945. The town stands on a sandy beach, and consists of two divisions separated by a canal. The "White Town," or European quarter, on the east, facing the sea, is very regularly laid out, with well-built houses. The "Black Town," or native quarter, on the west, consists of houses or huts of brick or earth, and a few pagodas. There is an iron pier, and railway communication with the South Indian system was opened in 1879.

Pontchartrain (pont-chär'trān), a lake of Louisiana, U. S., bordering on New Orleans, about 40 mi. long from east to west, and nearly 25 in breadth. It is from 12 to 14 ft. deep, and communicates with Lake Borgne on the east, with Lake Maurepas on the west, and by means of a canal with New Orleans on the south.

Pontiac, Oakland co., Mich., 26 mi. n. w. of Detroit. Railroads: Grand Trunk: D. G. H. & M.; and P. O. & N. Industries: large woolen mill, flour mills, wagon factory, foundries, pump and iron windmill works. It is the seat of the eastern Michigan insane asylum. Pop. 1900, 9,769.

Pon'tifex, among the ancient Romans a priest who served no particular divinity. The Roman pontifices formed the most illustrious among the great colleges of priests. Their institution was ascribed to Numa, and their number varied at different periods from four to sixteen. The *pontifex maximus*, or chief pontiff, held his office for life, and could not leave Italy.

Poodle, a small variety of dog covered with long, curling hair, and remarkable for its great intelligence and affection. The usual color is white, but black and blue, if good in other points, are highly valued.

Poole, William Frederick (1821-1894), the compiler of the *Index*, was b. at Salem, Mass., and graduated at Yale in 1849. While there he was librarian of a literary society, and prepared an index (pp. 154) of periodical literature, of which a second edition (pp. 521) was published in 1853, and a third (pp. 1,469), with the assistance of the American and British Library Associations, in 1882. A supplement (pp. 496), by Poole and W. J. Fletcher, of Amherst, was issued in 1888; and a similar one was promised for every five years. From 1856 to 1869 he was librarian of the Boston Athenæum; afterward he was employed in organizing libraries in various parts of the country, as at Waterbury, Conn., the naval academy at Annapolis, at Cincinnati, and 1888 at Chicago (the Newberry Library).

Poonah (or Puna), a city and district of Hindustan, in the presidency of Bombay. It is about 119 mi. e. of Bombay by the Great Indian Peninsular Railway. The city is well built, and has the Deccan college for classics, mathematics, and philosophy, and a college of science with special training in civil engineering, also training college, female normal school, and other schools, public library, hospital, arsenal, barracks, etc. It was the capital of the Peishwa, or head of the Mahratta confederacy. It is a health resort, and for part of the year the seat of the Bombay government. Manufactures include gold and silver jewelry, small ornaments in brass, copper, and ivory, and silk and cotton fabrics. It is an important military station (the cantonments lying to the north of the town), and good roads connect it with Bombay, Ahmednagar, Sattarah, etc. Pop. 129,751.

Pooree, a town and district in the province of Orissa, India. The town is 250 mi. s.w. from Calcutta, and 595 mi. n. of Madras. It contains the shrine of Juggernaut, to whose worship crowds flock from every part of India. Pop. 22,695. The district has an area of 2,473 sq. mi., and a pop. of 888,487.

Pope.—The derivation of the word has not been definitely determined, but the accepted meaning of it is *father*. From the earliest ages of Christianity the term father has been reverently applied to ecclesiastics. The title of Pope is, however, restricted to the pontiff or head of the Catholic Church. The Emperor Phocis decreed that to the Roman pontiff exclusively belonged the distinction of universal bishop. St. Peter is regarded as the first of the pontiffs of the Roman Catholic Church. This position of preëminence is accorded to the Apostle Peter because of Christ's saying, "And I say to thee that thou art *Peter* (rock) and on this rock I will build my Church and the gates of hell shall not prevail against it." According to tradition, Peter planted a church at Rome and died there a martyr.

Leo I, surnamed the Great (440-61), aimed to establish in the East and West a system of Papal vicariates, through which the Roman jurisdiction could be enforced and the Roman forms of faith permanently maintained. In the West he succeeded in this, but in the East his success was only partial and temporary. In 451 the Council of Chalcedon accepted the creed formulated by Leo, stating fully and clearly the belief in the union of the divine and human natures of Christ in one person. The fact that in 452, armed with none but spiritual weapons, Leo went out to meet the terrible Attila, and actually induced him to leave Italy without attacking Rome, is a convincing proof of the faith of the Pope and the power of the Church at this time.

During the German occupation of Italy the relations of the Popes with the barbarian rulers were friendly and the Church continued to prosper. Under the Byzantine sovereignty the prestige of the Church seemed in danger of disappearing. But this calamity was averted by the invasion of the Lombards, who drove the Byzantine garrisons from the country. During the following centuries of change, con-

fusion and ruin, the Christian Church alone retained its organization. Even the Lombards were in time converted to Christianity and the people who, until the overthrow of the Emperor, had been accustomed to depend upon Rome for guidance in temporal affairs now continued to look thither for spiritual control, and the Bishop of Rome was acknowledged throughout Western Europe as the Head of the Church. Thus for centuries the Papacy gained strength, the Christian fathers, Augustine, Gregory the Great and a host of other active men, shaping its doctrines and policy. In 754 Pepin I, the Frankish king, expelled the Lombards from their recent conquests and guaranteed to the Papacy the temporal sovereignty of a stretch of territory including Rome and a considerable surrounding country. (See *Papal States.*) In the year 800, Pope Leo III crowned Pepin's son Charlemagne Holy Roman Emperor, thus restoring the Western Empire. Many causes now combined to extend the power of the Church. During the political strifes of the Dark Ages the Church afforded a refuge to the oppressed. In the convents and monasteries alone did learning flourish. Priests were therefore the teachers, secretaries and ambassadors of kings.

Gradually the bishops acquired the right to try all cases relating to marriage, trusts, perjury, simony or concerning widows, orphans or Crusaders, and even criminal cases. Thus by the end of the twelfth century the Church had absorbed not only the whole legislative power over the clergy but in part over the laity also. Consequently, the principle was established that all cases might be appealed from the courts of the bishops and archbishops of the different European countries to the Papal See. The Pope thus came to be regarded as the fountain of justice and the supreme judge of Christendom, while emperors and kings bore the sword simply as his ministers to carry into effect his sentences and decrees.

In the tenth century, when Otto the Great assumed the title of Holy Roman Emperor, there began between the Pope and the Emperor a contest for supremacy which lasted many centuries. During this time all Christendom was virtually divided into two parties, the members of which were respectively supporters of the Imperial or the Papal claims. The Crusaders greatly strengthened the Papal power, as the prominent part which the Popes took in them naturally fostered their authority by placing in their hands the armies and resources of Christendom and accustoming the people to look to them as guides and leaders.

Pope Gregory VII, or Hildebrand, carried on two important reforms, the enforcement of celibacy among the secular clergy and the suppression of simony. The principal instruments relied upon by Gregory for the carrying out of these reforms were Excommunication and Interdict. Thus he did much toward establishing the universal spiritual and temporal sovereignty of the Holy See. In the thirteenth century the Papal power gained a signal triumph over the Imperial party by its victory over the house of Hohenstaufen. In the period which follows, the authority of the Popes was at its height. Under Pope Innocent III (1198-1216) almost all the kings and princes of Europe swore fealty to the Pope as their overlord.

One of the severest blows given both the temporal and the spiritual authority of the Popes was the removal in 1309 of the Papal chair from Rome to Avignon, France. During the seventy years or so while it remained there all the Popes were French and, their policies being shaped according to French ideas, the Papacy ceased to possess that sacred cosmopolitan character which had hitherto characterized it. The Catholic world was not again united under a spiritual head until the election of Martin V in 1417. But the temporal rulers of France, Germany and England, taking advantage of the disturbed condition of the Papal See, successively revolted and freed themselves from the authority of the Papacy as touching political or governmental affairs. They continued, however, to recognize the Pope as the Head of the Church and the rightful arbiter in all spiritual matters. In the sixteenth century the Popes took such a prominent part in the political movements of Europe that their territory and jurisdiction were greatly extended. During this century, the opposition which had been slowly gathering in the North culminated in the Protestant Reformation, which directly challenged the traditional supremacy of the Papacy. The answer of the Church was clearly set forth in the decrees of the Council of Trent (1543-1553), which reaffirmed in unmistakable terms the beliefs of the Church of Rome.

At the close of the eighteenth century and in the nineteenth, changes took place in Europe which closely affected the Papal power. In 1797 the Pope was obliged to cede several of the States of the Church to Napoleon. A year later the remaining Papal States were erected into a Roman Republic, but in 1801 the Papal power was partly restored over them. In 1808-9 they were incorporated in the French Empire, but were again restored by the aid of the Austrians in 1815. When Pius IX ascended the Papal throne in 1846 his chief aim was to bring about a confederation of the Italian States under the Papal supremacy. With this object in view he placed himself at the head of the movement for reform, reorganized the municipal government of Rome and granted a constitution to the Papal States. In 1848 Pius was forced to flee to Gaeta, while Rome was proclaimed a republic. In 1850 he was restored to his rightful place by the aid of the French. In 1860 a large part of his dominions was annexed by Victor Emmanuel and in 1870 the remnant of the Papal States voted for union with the Kingdom of Italy, depriving the Pope of dominions. In accordance with the conviction of Roman Catholics generally, that it is not fitting that the Head of the Church be subject to any temporal ruler, the Pope has since 1870 remained in the Vatican, where his jurisdiction is still supreme. In spiritual mat-

ters the Papal authority has, however, never been stronger than at the opening of the twentieth century, and even in temporal affairs the Papal influence continues to make itself felt through the Pope's vicegerents in every land.

By the decrees of the Vatican Council of 1870 the pope has supreme power in matters of discipline and faith over all and each of the pastors and of the faithful. It is further taught by the Vatican Council that when the pontiff speaks *ex cathedra*, that is, when he, in virtue of his apostolic office, defines a doctrine of faith and morals to be held by the whole church, he possesses infallibility by divine assistance. The pope cannot annul the constitution of the church as ordained by Christ. He may condemn or prohibit books, alter the rites of the church, and reserve to himself the canonization of saints. A pope has no power to nominate his successor, election being entirely in the hands of the cardinals, who are not bound to choose one of their own body. The papal insignia are the tiara or triple crown, the straight crosier, and the pallium. He is addressed as "Your Holiness."

We subjoin a table of the popes, according to the Roman Notizie, with the dates of the commencement of their pontificates. The names printed in italics are those of antipopes.

St. Peter....A. D. 42
St. Linus.... 66
St. Anacletus.... 78
St. Clement I.... 91
St. Evaristus.... 100
St. Alexander I.... 108
St. Sixtus I.... 119
St. Telesphorus.... 127
St. Hyginus.... 139
St. Pius I.... 142
St. Anicetus.... 157
St. Soterus.... 168
St. Eleutherius.... 177
St. Victor I.... 193
St. Zephirinus.... 202
St. Calixtus I.... 217
St. Urban I.... 223
St. Pontianus.... 230
St. Anterus.... 235
St. Fabian.... 236
St. Cornelius.... 250
St. Lucius I—*Novatianus*.... 252
St. Stephen I.... 253
St. Sixtus II.... 257
St. Dionysius.... 259
St. Felix I.... 269
St. Eutychianus.... 275
St. Caius.... 283
St. Marcellinus.... 296
(See vacant 3 years and 6 months.)
St. Marcellus I.... 308
St. Eusebius.... 310
St. Melchiades or Miltiades.... 311
St. Sylvester I.... 314
St. Marcus.... 336
St. Julius I.... 337
Liberius.... 352
St. Felix II (sometimes reckoned an antipope).... 355
St. Damasus I.... 366
St. Siricius.... 384
St. Anastasius I.... 398
St. Innocent I.... 402
St. Zosimus.... 417
St. Boniface I—*Eulalius*.... 418
St. Celestine I.... 422
St. Sixtus III.... 432
St. Leo I. the Great.... 440
St. Hilary.... 461
St. Simplicius.... 468
St. Felix III.... 483
St. Gelasius I.... 492
St. Anastasius II.... 496
St. Symmachus.... 498
St. Hormisdas—*Lawrence*.... 514
St. John I.... 523
St. Felix IV.... 526
Boniface II—*Dioscorus*.... 530
John II.... 533
St. Agapetus I.... 535
St. Sylverius.... 536
Vigilius.... 537
Pelagius I.... 555
John III.... 560
Benedict (I) Bonosus. 574
Pelagius II.... 578
St. Gregory I. the Great.... 590
Sabinianus.... 604
Boniface III.... 607
St. Boniface IV.... 608
St. Deusdedit.... 615
Boniface V.... 619
Honorius I.... 625
(See vacant 1 year and 7 months).
Severinus.... 640
John IV.... 640
Theodorus I.... 642
St. Martin I.... 649
St. Eugenius I.... 654
St. Vitalianus.... 657
Adeotatus.... 672
Donus or Domnus I.... 676
St. Agathon.... 678
St. Leo II.... 682
St. Benedict II.... 684
John V.... 685
Conon—*Theodorus; Paschal*.... 686
St. Sergius I.... 687
John VI.... 701
John VII.... 705

Sisinnius.... 708
Constantine.... 708
St. Gregory II.... 715
St. Gregory III.... 731
St. Zachary.... 741
Stephen II (died before consecration).. 752
Stephen III.... 752
St. Paul I—*Constantine; Theophylactus; Philip*.... 757
Stephen IV.... 768
Adrian I.... 772
St. Leo III.... 795
Stephen V.... 816
St. Paschal I.... 817
Eugenius II.... 824
Valentinus.... 827
Gregory IV.... 827
Sergius II.... 844
St. Leo IV.... 847
Benedict III—*Anastasius*.... 855
St. Nicholas I.... 858
Adrian II.... 867
John VIII.... 872
Marinus I, or Martin II.... 882
Adrian III.... 884
Stephen VI.... 885
Formosus.... 891
Boniface VI (reigned only 18 days).... 896
Stephen VII.... 896
Romanus.... 897
Theodorus II—*Sergius III*.... 898
John IX.... 898
Benedict IV.... 900
Leo V.... 903
Christopher.... 903
Sergius III.... 904
Anastasius III.... 911
Lando.... 913
John X.... 914
Leo VI.... 928
Stephen VIII.... 929
John XI.... 931
Leo VII.... 936
Stephen IX.... 939
Marinus II, or Martin III.... 943
Agapetus II.... 946
John XII—*Leo VIII*.... 956
Benedict V.... 964
John XIII.... 965
Benedict VI.... 972
Donus or Domnus II.. 974
Benedict VII.... 975
John XIV—*Boniface VII*.... 983
John XV.... 985
Gregory V—*John XVI* 996
Sylvester II.... 999
John XVI or XVII.. 1003
John XVII or XVIII. 1003
Sergius IV.... 1009
Benedict VIII—*Gregory VI*.... 1012
John XVIII or XIX.. 1024
Benedict IX (deposed)—*John XX*.... 1033
Gregory VI—*Sylvester III*.... 1045
Clement II.... 1046
Damasus II—*Benedict IX* attempts to resume the throne.... 1048
St. Leo IX.... 1049
Victor II.... 1055
Stephen X.... 1057
Benedict X.... 1058
Nicholas II.... 1058
Alexander II—*Honorius II*.... 1061
Gregory VII (Hildebrand)—*Clement III*. 1073
(See vacant 1 year.)
Victor III.... 1086
Urban II.... 1088
Paschal II.... 1099
Gelasius II—*Gregory VIII*.... 1118
Calixtus II.... 1119
Honorius II—*Celestine II*.... 1124
Innocent II—*Anacletus II; Victor IV*.... 1130
Celestinus II.... 1143
Lucius II.... 1144
Eugenius III.... 1145
Anastasius IV.... 1153
Adrian IV (Nicholas Breakspear, an Englishman).... 1154
Alexander III—*Victor V; Paschal III; Calixtus III; Innocent III*.... 1159
Lucius III.... 1181
Urban III.... 1185
Gregory VIII.... 1187
Clement III.... 1187
Celestinus III.... 1191
Innocent III.... 1198
Honorius III.... 1216
Gregory IX.... 1227
Celestinus IV.... 1241
(See vacant 1 year and 7 months.)
Innocent IV.... 1243
Alexander IV.... 1254
Urban IV.... 1261
Clement IV.... 1265
(See vacant 2 years and 9 months.)
Gregory X.... 1271
Innocent V.... 1276
Adrian V.... 1276
John XIX or XX or XXI.... 1276
Nicholas III.... 1277
Martin IV.... 1281
Honorius IV.... 1285
Nicholas IV.... 1288
(See vacant 2 years and 3 months.)
St. Celestinus V.... 1294
Boniface VIII.... 1294
Benedict XI.... 1303
Clement V (papacy removed to Avignon).. 1305
(See vacant 2 years and 3 months.)
John XXII.... 1316
Benedict XII—*Nicholas V at Rome*.... 1334
Clement VI.... 1342
Innocent VI.... 1352
Urban V—*Clement VII*. 1362
Gregory XI (throne restored to Rome).. 1370
Urban VI.... 1378
Boniface IX—*Benedict XIII at Avignon*.... 1389
Innocent VII.... 1404
Gregory XII.... 1406
Alexander V.... 1409
John XXIII.... 1410
Martin V—*Clement VIII*.... 1417
Eugenius IV—*Felix V*. 1431
Nicholas V.... 1447
Calixtus III.... 1455
Pius II.... 1458
Paul II.... 1464
Sixtus IV.... 1471
Innocent VIII.... 1484
Alexander VI.... 1492
Pius III.... 1503
Julius II.... 1503
Leo X.... 1513
Adrian VI.... 1522
Clement VII.... 1523
Paul III.... 1534
Julius III.... 1550
Marcellus II.... 1555
Paul IV.... 1555
Pius IV.... 1559
St. Pius V.... 1566
Gregory XIII.... 1572
Sixtus V.... 1585

Urban VII	1590	Clement XI	1700
Gregory XIV	1590	Innocent XIII	1721
Innocent IX	1591	Benedict XIII	1724
Clement VIII	1592	Clement XII	1730
Leo XI	1605	Benedict XIV	1740
Paul V	1605	Clement XIII	1750
Gregory XV	1621	Clement XIV	1769
Urban VIII	1623	Pius VI	1775
Innocent X	1644	Pius VII	1800
Alexander VII	1655	Leo XII	1825
Clement IX	1667	Pius VIII	1829
Clement X	1670	Gregory XVI	1831
Innocent XI	1676	Pius IX	1846
Alexander VIII	1689	Leo XIII	1878
Innocent XII	1691	Pius X	1903

Pope, Alexander (1688–1744), a celebrated English poet. His education was a desultory one. He picked up the rudiments of Greek and Latin from the family priest, and was successively sent to two schools, one at Twyford, the other in London. Before he was fifteen he attempted an epic poem, and at the age of sixteen his *Pastorals* procured him the notice of several eminent persons. In 1711 he published his poem the *Essay on Criticism*, which was followed by *The Rape of the Lock*, a polished and witty narrative poem founded on an incident of fashionable life. His next publications were *The Temple of Fame*, a modernization and adaptation of Chaucer's *House of Fame; Windsor Forest*, a pastoral poem; and *The Epistle of Eloisa to Abelard*. From 1713 to 1726 he was engaged on a poetical translation of Homer's works, the *Iliad* being wholly from his pen, the *Odyssey* only half. In 1728 he published his *Dunciad*, a mock heroic poem intended to overwhelm his antagonists with ridicule. This was followed by *Imitations of Horace*, and by *Moral Epistles or Essays*. His *Essay on Man* was published anonymously in 1733, and completed, and avowed by the author in the next year. In 1742 he added a fourth book to his *Dunciad*, in which he attacked Colley Cibber, then poet laureate. He d. and was interred at Twickenham. Pl. 35, Vol. IV.

Poplar, a well known genus of hardy deciduous trees, with both barren and fertile flowers in catkins, stamens four to thirty, leaves alternate, broad, with long and slender footstalks flattened vertically, the leaves having generally more or less of a tremulous motion. About eighteen species have been observed, natives of Europe, Central and Northern Asia, and North America. Some of the poplars are the most rapid growers of all hardy forest trees. They thrive under a variety of conditions as regards soil, etc., but do best in damp situations. The timber of the poplar is white, light, and soft, and not very valuable.

Popocatepetl, an active volcano in Mexico, in the province of Puebla. Its height has been estimated at 17,884 ft. The crater is 3 mi. in circumference, and 1,000 ft. deep, and contains vast quantities of the purest native sulphur, which until comparatively recently has not been commercially valuable. The mountain was first ascended in 1522. Forests cover the base of the mountain, but its summit is mostly covered with snow.

Poppy, the common name for plants bearing large, brilliant, but fugacious flowers. The white poppy yields the well known opium of

commerce. Most of the species are natives of Europe. They often occur as weeds in fields and waste places, and are frequently also cultivated in gardens for ornament. The seeds of the white poppy yield a fixed, harmless oil, employed for culinary purposes; and the oil-

Opium Poppy. *a.*—whole plant; *b.*—flower and leaf; *c.*—ripe capsule; *d.*—seed and section of ditto enlarged.

cake is used for feeding cattle. The roots of the poppy are annual or perennial; the calyx is composed of two leaves, and the corolla of four petals; the stamens are numerous, and the capsule is one celled, with several longitudinal partitions, and contains a multitude of seeds.

Population.—The power of propagation inherent in all organic life may be regarded as infinite. There is no one species of vegetable or animal which under favorable conditions as to space, climate, and food (that is to say, if not crowded and interfered with by others), would not in a small number of years overspread every region of the globe. To this property of organized being the human species forms no exception. And it is a very low estimate of its power of increase if we only assume that, under favorable conditions, each generation might be double the number of the generation which preceded it. Taking mankind in the mass, the individual desire to contribute to the increase of the species may be held to be universal, but the actual growth of population is nowhere left to the unaided force of this motive, and nowhere does any community increase to the extent of its theoretical capacity, even though the growth of population has come to be commonly considered as an indispensable sign of the prosperity of a community. For one thing population cannot continue to increase beyond the means of subsistence, and every increase beyond actual or immediately attainable means, must lead to a destruction of life. But if population is

thus actually limited by the means of subsistence, it cannot be prevented by these means from going further than these means will warrant; that is to say, it will only be checked or arrested after it has exceeded the means of subsistence. It becomes then an inquiry of great importance by what kind of checks population is actually brought up to the point at which it is in fact arrested. This inquiry was at first systematically treated in an *Essay on the Principle of Population* published in 1798 by the Rev. T. R. Malthus. Malthus points out that population increases in a geometrical, while the means of subsistence only increase in an arithmetical, ratio. And in examining the bearing on each other of the different ratios of increase of human life, and of the means of supporting it, he has deduced a law to the proof of which a considerable portion of his work is devoted. This law is that the energy of reproduction rises above all the ordinary accidents of human life, and the inevitable restraints imposed by the various organizations of human society, so that in all the various countries and climates in which men have lived, and under all the constitutions by which they have been governed, the normal tendency of population has always been to press continuously upon the means of subsistence. Malthus divides the checks on the increase of population into two classes, preventive and positive; the one consisting of those causes which prevent possible births from taking place, the other of those which, by abbreviating life, cut off actual excesses of population. In a further analysis of these checks he reduces them to three—vice, misery, and moral restraint. The proof of his main position is historical and statistical. In regard to the subsidiary inquiry, the most striking point brought out is the rarity of moral restraint and the uniform action, in innumerable forms, of vice and misery. In order that the latter should be weakened in their action, and the former strengthened, it is desirable to have the general standard of living in a community raised as high as possible, and that all may look to the attainment of a position of comfort by the exercise of prudence and energy.

The population of the world at the beginning of the twentieth century is not far from a billion and a half. The latest estimates give the following density of population:

	Area in thousands of sq. mi.	Pop. in millions.	Persons per sq. mi.
Europe	3,742	373	99.66
Asia	17,101	831	48.57
Africa	11,510	170	14.77
America	14,805	133	8.96
Australasia	3,457	6	1.73
Polar Regions	1,732	.082	0.05

Por'cupine, a name of certain rodent quadrupeds. The body is covered, especially on the back, with the so-called *quills*, or dense, solid, spine-like structures, intermixed with bristles and stiff hairs. There are two incisors and eight molar teeth in each jaw, which

continue to grow throughout life from permanent pulps. The muzzle is generally short and pointed, the ears short and rounded. The anterior feet possess four, and the hinder feet five toes, all provided with strong thick nails. The common or crested porcupine, found in Southern Europe and in Northern Africa, is the best known species. When fully grown it measures nearly 2 ft. in length, and some of its spines exceed 1 ft. Its general color is a

Common Porcupine.

grizzled dusky black. The spines in their usual position lie nearly flat, with their points directed backward; but when the animal is excited they are capable of being raised. The quills are loosely inserted in the skin, and may, on being violently shaken, become detached—a circumstance which may probably have given rise to the purely fabulous statement that the animal possessed the power of actually ejecting its quills like arrows or darts at an enemy. These animals burrow during the day, and at night search for food, which consists chiefly of vegetable matter. Of the American species, the Canadian or North American porcupine is the best known. It is about 2 ft. long, and of slow and sluggish habits. The quills in this species are short, and are concealed among the fur. The ears are short, and hidden by the fur. The tail is comparatively short.

Pogie, a fish with an oblong body, scaly cheeks, and one dorsal fin, found off the coasts of the U. S. It is one of the most important food fishes, and attains a length of 18 in. and a weight of 4 lbs.

Pork, the flesh of swine, is one of the most important and widely used species of animal food. Pork is coarser and ranker than beef or mutton, but when of good quality and well cured it develops a richness and delicacy of flavor in marked contrast with the dryness and insipidity of other salted meat. The abundance and digestive quality of its fat renders it suitable diet for cold climates. The swine was forbidden to be eaten by the Mosaic law, and is regarded by the Jews as especially typical of the unclean animals. Other Eastern nations had similar opinions as to the use of pork. Pork contains less fibrine, albuminous and gelatinous matter than beef or mutton.

Porphyry, originally the name given to a very hard stone, partaking of the nature of granite, susceptible of a fine polish, and consequently much used for sculpture. In the fine arts it is known as *Rosso Antiquo,* and by geologists as *Red Syenitic Porphyry.* It consists of a homogeneous, feldspathic base or matrix, having crystals of rose-colored feldspar, called oligoclase, with some plates of blackish hornblende, and grains of oxidized iron ore imbedded, giving to the mass a speckled complexion. It is of a red, or rather of a purple and white color, more or less variegated, the shades being of all gradations from violet to a claret color. Egypt and the East furnish this material in abundance. It also abounds in Minorca, where it is of a red-lead color, variegated with black, white, and green. Pale and red porphyry, variegated with black, white, and green, is found in separate nodules in Germany, England, and Ireland. The art of cutting porphyry as practised by the ancients appears to be quite lost.

Porphyry (Porphyrios) (233–305), a Greek philosopher of the Neo-Platonic school, celebrated as an antagonist of Christianity. He studied under Longinus at Athens, and at the age of thirty placed himself under the teaching of Plotinus at Rome. About 268 he went to Sicily, where he is said to have written his treatise against the Christians, which was publicly burned by the Emperor Theodosius, and is only known from fragments in the authors who have refuted him. Porphyry recognized Christ as an eminent philosopher, but he charged the Christians with corrupting his doctrines. He was a voluminous writer, but few of his works are extant. The most important are his *Lives of Plotinus and Pythagoras.*

Porpoise, a genus of cetacean mammalia, belonging to the family Delphinidæ (dolphins, etc.). The common porpoise (*Phocæna communis*) is the smallest and most familiar of all Cetacea, and occurs plentifully off the British coast and in the North Sea. It attains an average length of 5 ft. The front of the head is convex in form, and has the spiracle or blow-hole in the middle line. The eyes and ears are small. The caudal fin is horizontal and flattened. The neck is very short. The fore limbs project from the body. No hind limbs are developed. The teeth are small with blunted crowns. The stomach is in three portions. No olfactory nerves exist. The porpoise feeds almost entirely on herrings and other fish, and herds or "schools" of porpoises follow the herring shoals, among which they prove very destructive. An allied species is the round-headed porpoise, or "caaing whale" of the Shetlanders. These latter measure from 20 to 24 ft. in length, and are hunted for the sake of the oil.

Port, a harbor or haven, or place where ships receive and discharge cargo. A *free port* is one at which the goods imported are exempted from the payment of any customs or duties, as long as they are not conveyed into the interior of the country.

Port, the name given to the left side of a ship (looking toward the prow), as distinguished from the starboard or right side. Formerly *larboard* was used instead of *port.*

Porta. See *Baccio della Porta.*

Portage, Columbia co., Wis., on Wisconsin River, at head of navigation. Railroads: Wisconsin Central, and C. M. & St. P. Industries: hosiery and knitting mills, plow factory, foundry. Granite and jasper are found in the vicinity. Pop. 1900, 5,459.

Port-au-Prince (por-tō-prans), capital of the Republic of Hayti, on the western side of the island, at the southeast extremity of the bay of the same name. It is built on a low and unhealthy spot, consists chiefly of wooden houses, and contains an ungainly palace, a senate house, a Roman Catholic church, a customhouse, mint, a hospital, lyceum, etc. The chief exports are mahogany and red-wood, coffee, and cocoanuts. Pop. 40,000.

Port Chester, Westchester co., N. Y., on Long Island Sound, 26 mi. n.e. of New York. Railroad, N. Y. N. H. & H. Industries: stoves, iron bolts, shirt factory, cotton mills, etc. Pop. 1900, 7,440.

Porter, David Dixon (1813–1891), naval officer, was b. in Chester, Penn. He entered the U. S. navy as a midshipman in 1829. He served during the entire Mexican War, and was in every action on the coast. At the beginning of the Civil War he was placed in command of the steam frigate Powhatan. In command of a mortar fleet he rendered assistance in the reduction of forts Jackson and St. Philip; likewise in the capture of Vicksburg and Arkansas Post. For these services he was made rear admiral. In 1865 with General Terry captured Fort Fisher. In 1866 he was promoted to vice admiral, and in 1870 appointed admiral.

Porter, General Fitz-John (1822–1901); b. at Portsmouth, N. H., August 31, 1822. He was educated at West Point, and served through the Mexican and Civil Wars. He held the command of a corps in the Army of the Potomac and gained distinction in the battles of Gaines Mill and Malvern Hill. His command took part in the second battle of Bull Run, where he remained inactive the first day and was especially active the second day. This action caused him to be court-martialed and dismissed from the service. He was restored with the rank of colonel by an act of congress in 1886, and was retired at his own request. Later he engaged in business.

Porter, Horace, soldier and diplomat, was b. in Pennsylvania in 1827. He was educated at the Lawrence Scientific School at Harvard and at West Point. He had just graduated from the military school when the war broke out. He entered the army and won distinction as a commander. In 1867 General Porter was made assistant secretary of war by Grant in Johnson's cabinet. In 1897 he was appointed ambassador to France by President McKinley.

Porter, Jane (1776–1850), was b. at Durham. Her publications include *Thaddeus of Warsaw* and *The Scottish Chiefs.* Died at Bristol.

Porter, Noah, D. D. LL.D. (1811–1892), an

American philosopher and writer, b. at Farmington, Conn. Graduating at Yale College in 1831, he was ordained pastor of the Congregational church, New Milford, Conn., in 1836, and in 1843 settled at Springfield, Mass. Returning to Yale in 1846 as professor of metaphysics and moral philosophy, he was elected president in 1871, and continued to hold that position till 1886. Among his chief works are *Historical Discourses, The Human Intellect, Books and Reading, The Science of Nature Versus the Science of Man, The Elements of Intellectual Philosophy, The Elements of Moral Science, Bishop George Berkeley*, and *Kant's Ethics*. Dr. Porter also edited an edition of Webster's Dictionary.

Port Hope, a town of Canada on the northern shore of Lake Ontario, 63 mi. n.e. of Toronto by the Grand Trunk Railway. The town is beautifully situated on the lake. It has a good trade in timber, grain and flower. Pop. 5,042.

Port Huron, co. seat of St. Clair co., Mich.; port of entry, on the St. Clair and Black rivers, at the foot of Lake Huron, and on the Grand Trunk & Pere Marquette railroads; is connected with Sarnia, Canada, by a steam ferry and a tunnel. It has a large grain, lumber and wool trade. The locomotive shops of the Grand Trunk R. R. are located here. Among many handsome buildings is the U. S. government building, costing $250,000. Pop. 1900, 19,158.

Portico, in architecture, a kind of porch before the entrance of a building fronted with columns, and either projecting in front of the building or receding within it. Porticoes are styled tetrastyle, hexastyle, octostyle, decastyle, according as the columns number four, six, eight, or ten.

Port Jervis, Orange co., N. Y., on Delaware River and Delaware and Hudson canal, 88 mi. n.w. of New York. Railroads: Erie & Port Jervis; Monticello & New York. Industries: iron foundry, railroad shops, and various other industries including glass works and boot and shoe factories. Pop. 1900, 9,385.

Portland, Cumberland co., Me., on an arm of Casco Bay, 108 mi. n.e. of Boston. Railroads: Boston & Maine; Maine Central; Portland & Rochester; Grand Trunk; and Portland & Rumford Falls. Industries: wire screens, several iron foundries and farm-implement factories, furniture, canned goods, box, leather, clothing, and match factories. Surrounding country agricultural. The town was first settled in 1622 and became a city in 1832. Pop. 1900, 50,145.

Portland, Multnomah co., Oregon, on Willamette River. Railroads: Union Pacific; Northern Pacific; and Oregon & Colorado. Industries: iron and woolen mills, flour, lumber, paper, furniture, carriages, paints, oils, pottery, cement and lime works. It is the trade center of Oregon, Washington, and Idaho, and has a large export trade in grain, fruit, flour, and lumber. The medical department of Willamette and the law department of the University of Oregon are located here. Pop. 1900, 90,426.

Portland, a town of New Brunswick, really a suburb of St. John City, with which it has been recently united. Pop. 15,226.

Portland Beds, in geology a division of the Upper Oolites occurring between the Purbeck Beds and the Kimmeridge Clay, consisting of beds of hard oolitic limestone and freestone interstratified with clays and resting on light-colored sands which contain fossils, chiefly mollusca and fish, with a few reptiles. They are named from the rocks of the group forming the Isle of Portland in Dorsetshire from whence they may be traced through Wiltshire as far as Oxfordshire.

Portland Cement. See *Cement*.

Porto Rico, one of the islands of the West Indies, the fourth in size of the Antilles, east of Hayti; area, with subordinate isles, 3,606 sq. mi. The island is beautiful and very fertile. A range of mountains, covered with wood, traverses it from east to west, averaging about 1,500 ft. in height, but with one peak 3,678 ft. high. In the interior are extensive savannahs; and along the coast tracts of fertile land, from 5 to 10 mi. wide. The streams are numerous, and some of the rivers can be ascended by ships to the foot of the mountains. There are numerous bays and creeks. The chief harbor is that of the capital, San Juan de Porto Rico; others are Mayaguez, Ponce, and Arecibo. The climate is rather healthy except during the rainy season (September to March). Gold is found in the mountain streams. Copper, iron, lead, and coal have also been found; and there are salines or salt ponds. The chief products are sugar, rum, molasses, coffee, cotton, tobacco, hides, live-stock, dye woods, timber, rice, etc. The island was discovered by Columbus in 1493, and was settled by the Spaniards in 1510. The island was ceded by Spain to the U. S. at the close of the Spanish-American war in 1898.

Population. (United States Census, October, 1899).—According to the census taken under the direction of the United States War department, the population is 953,243. The growth in population is shown by the following table:

Census of	*Population*
1860	583,308
1877	731,648
1887	798,565
1897	899,439
1899	953,243

Porto Rico has 264 persons to a square mile, the density of population being twice that of New York State. The area, population, and density of population of the seven departments are as follows:—

Department.	*Area.*	*Pop. 1899.*	*Persons to sq. mi.*
Guayama	561	111,986	200
Humacao	413	88,501	214
Ponce	822	203,191	247
Arecibo	621	162,308	261
Bayamon	542	160,046	295
Mayaguez	407	127,566	313
Aguadilla	240	99,645	415
Total	3,606	953,243	264

Cities and Towns.— There are no large cities in the island; San Juan, the largest, has a population of 32,048; Ponce, 27,952; Mayaguez, 15,187; Arecibo, 8,008. There are fifty-seven cities of 1,000 inhabitants or more.

Following is a list of the cities of over 5,000 inhabitants: —

Cities	*Population*
Aguadilla	6,425
Arecibo	8,008
Caguas	5,450
Guayama	5,334
Mayaguez	15,187
Ponce	27,952
San Juan	32,048
Yauco	6,108

Of the total population of 953,243, there are 8,721 more males than females.

The population under ten years of age is 31 per cent of the total.

Porto Rico

Over eighty-three per cent of the population, according to the report of General Davis, could not read or write in 1899. The misfortunes, too, of flood and famine, which have occurred since the American occupation, have in themselves been such a check to enterprise of any kind as to forbid expectation of progress in education. Nevertheless, a decided change has taken place. With the conviction that the common school is a safeguard of the people, the military governor, General Henry, recommended the organization of the school system of the island, the need of which was recognized by representative Porto Ricans, who had already drawn up resolutions requiring the establishment of kindergartens and normal schools, and asking other changes after the pattern of schools in the United States. General John Eaton, formerly Commissioner of Education, was appointed by Señor Salvador Carbonell, secretary of the interior, December 31, 1898, to take charge of the work,

There are in the island 59,390 negroes, 304,352 persons of mixed blood, and 75 Chinese, making a total colored population of 363,817, or 38.2 per cent of the total.

The native born population constitutes 98.5 per cent of the total, and 69.7 per cent are single.

The number of children of school age, 5 to 17, is 322,393. Of these only 8.1 per cent attended school in 1899.

There are 659,294 persons over 10 years of age, of whom 509,498, or 77.3 per cent, can not read. There are 15,380 who can read but can not write. The number of those who have superior education is given as 5,045. The number of males of voting age is 201,071. Of these 47,973 only could read.

Education.— The following facts regarding the status of education in Porto Rico are drawn from the report of the United States Commissioner of Education for the fiscal year ending June 30, 1900.

The former condition of the people of Porto Rico seems to have been unfavorable to popular education. Poverty bred apathy, and the antecedents of the greater part of the people, from an intellectual standpoint, were unfortunate.

and he continued in office as chief of the bureau of education of Porto Rico until May, 1900. He was then succeeded in his duties by Dr. Victor S. Clark, who has presented a very full report on education in Porto Rico to Hon. Geo. W. Davis, military commander.

In many respects the common-school system was in an unsatisfactory condition. There were no schoolhouses which had been especially built for the purpose, and suitable school furniture and materials were wanting, while the school was often kept in the dwelling of the teacher, who frequently carried on some other occupation while performing his function of teacher. This condition was recognized and deplored by the Spanish inspectors in 1880, who reported upon the illiteracy of the population, the incompetence of the teachers, their ignorance of methods, the want of school accommodations, furniture, text-books, maps, blackboards, etc. The cause of this state of things was to be found in the political and social condition of the island, and is explained in the interesting history of education in Porto Rico under the Spanish rule by Señor Enrique C. Hernandez, secretary of the insular board of education, contained in Dr. Clark's report.

From that history we see that the Porto Ricans always had more or less education for the wealthy class, but that primary education had been neglected (as it was in the mother country and many other countries in Europe) until 1820, notwithstanding the laudable efforts of municipalities and individuals to establish schools. The conditions of the island practically forbade schools.

An order was issued on May 1, 1899, by the military governor, which reorganized the system of education. An insular board of education consisting of five members was created July 3, 1899, which was to act in an advisory or superintending capacity. The president of this board was the insular superintendent of education. By the act of Congress of April 12, 1900, the charge of public instruction is placed under a commissioner of education, who shall make such report as may be required by the Commissioner of Education of the United States. The order of 1899 divided the island into school districts something like those in the United States, provided English supervisorships, prescribed the manner of electing local school boards, established fines for nonattendance to duty on the part of the boards, and provided for district school taxes and for the issuance of district bonds. The municipalities were required to provide buildings or quarters for the schools, the schools were graded, the courses of study prescribed, and the qualifications of the teachers were defined, and their salaries fixed, free text-books were provided for, and high schools, a normal school, and professional schools were organized.

At the close of the school year, June, 1899, there were 212 town schools, 313 county districts with schools, and 426 without schools. In a population of 857,660 there were 152,961 boys and 144,851 girls of school age, of whom only 19,804 boys and 9,368 girls were enrolled in the schools, a total of 29,172, while the attendance was 21,873, leaving 268,630 children without school facilities. There were 582 teachers in 1898–99, 74 of whom were from the United States. The salaries ranged from $30 to $75 dollars per month in gold. The municipal expenditure for schools in 1898–99 was $203,372.99, and the total expenditure $279,216. The insular appropriation for schools for 1899–1900 was $330,050. In the first term, 1899–1900, the enrollment was 15,440 boys, 8,952 girls, total 24,392. Average daily attendance, 20,103. Population of the island, 957,779. The board of education offered an annual appropriation of $20,000 for any town in the island which would provide a like amount for site and buildings for an industrial and normal school. This offer was accepted by the town of Fajardo.

Civil Government Established.—On the first of May, 1900, the government of Porto Rico was transferred from the military to the civil authorities constituted under the act of Congress approved April 12, 1900. In his annual report for 1900 the Secretary of War makes the following comment upon the conduct of the affairs of the island under a military governor:—

"After all the disorder, lawlessness, and distress consequent upon a state of war, the withdrawal of accustomed control, the transfer of sovereignty to a people unfamiliar with the language, the customs, and prejudices of the island, the long delay in the legislation establishing civil and political rights and business relations, the poverty, ruin, and suffering caused by the great hurricane, the military governor was able to say, at the close of his administration:—

"'On April 30 the machinery of civil government was in charge of experienced public officers, and the organization, with departments, bureaus, and other branches, both insular and municipal, was such that the new government ordered by congress to be instituted could the following day be launched and carried forward in an efficient and economic manner. The courts of the island were all in the discharge of their proper functions. The dockets were not crowded as they were a year before. The prisons and jails were well kept, and were not overflowing. The public highways were in fine condition and were being rapidly extended. The amount that could be spared from the treasury for education was being applied in such a manner as to give instruction according to modern methods to over 30,000 children. The laws of taxation had been so changed that very heavy and onerous burdens had been removed from the poor. In office in every municipality were officers who in every instance were the choice of the electors, thus granting to municipalities almost complete autonomy. Life and property were everywhere secure, and this without the use of troops for protection. Notwithstanding the most grievous losses suffered by the people from raids of banditti, from arson, from disturbance of trade relations, from losses of Spanish markets without corresponding gains elsewhere, from unsettled conditions resulting from the use of a currency which suffered a heavy discount when referred to a gold basis, and, finally, from the almost overwhelming disaster of August of last year, when seven-tenths of all the maturing crops were blotted out of existence—notwithstanding all these obstacles and burdens, the military governor was able to turn over to the civil governor the comfortable balance in the insular treasury of over $300,000.'"

The distribution of supplies to the sufferers from the hurricane continued up to July 15, 1900. In all, 30,000,000 pounds of food, costing $831,480.16, were distributed by a board of charities, of which the chief surgeon of the military department was president, and in which the entire organization of the army in the department was utilized. To as great an extent as practicable the owners of the coffee plantations were utilized in the distribution of rations, and the able-bodied men receiving them were required, in return for rations, to engage in the work of recovering the plantations from the destruction wrought by the hurricane, in order that as soon as possible the production of coffee in the island might be revived. In addition to the supplies con-

tributed by the public, the central Porto Rican relief committee received contributions of money amounting to $81,090.58. Of this amount, over $46,000 was used in the purchase of food, medical and hospital supplies, and clothing; the expenses of the committee amounted to over $2,000; and the balance was used to aid in the establishment and maintenance of an asylum for the care of orphan children whose parents had lost their lives in, or in consequence of, the hurricane. For the purpose of furnishing further relief, by giving employment instead of alms, and at the same time securing much-needed means of communication, an expenditure of $200,000 was authorized in October, 1899, and the further expenditure of $750,000 was authorized in February and May, for the construction of military roads.

The law which provided for civil government in Porto Rico made the following general provisions: The capital is San Juan, and the seat of government is to be maintained there; the official title of the chief executive officer shall be, "The governor of Porto Rico." He shall be appointed by the President, by and with the consent of the senate; he shall hold his office for a term of four years, unless sooner removed by the President; he has all the powers of the governors of the territories of the United States that are not locally inapplicable; he is also required to make official reports at least annually, as to the condition of affairs in the island. The other executive officers provided for are a secretary, an attorney-general, a treasurer, an auditor, a commissioner of the interior, and a commissioner of education.

The legislative branch of the government comprises two bodies — one being the executive committee appointed by the president, made up of the secretary, attorney-general, treasurer, auditor, and the commissioners of the interior and education, with five other persons of good repute (five of the eleven being native inhabitants), who hold office for four years. The other house consists of thirty-five delegates elected biennially by the qualified voters. These two houses have much the same power as legislatures in the territories. Courts of various kinds are also provided for. The salary of the governor is $8,000 per year.

The island is to have "a resident commissioner" in the United States, who is to be elected at the general elections. The law specifies that he "shall be entitled to official recognition by all departments upon presentation to the department of state of a certificate of election of the governor of Porto Rico." The salary of the commissioner is fixed at $5,000 per annum, to be paid by the United States. "No person shall be eligible to such election who is not a bona-fide citizen of Porto Rico, who is not thirty years of age, and who does not read and write the English language."

President McKinley appointed as governor Hon. Charles H. Allen, of Massachusetts; treasurer, J. H. Hollander; auditor, John R. Garrison. Governor Allen resigned and was succeeded by Hon. Wm. H. Hunt, Sept. 1, 1901.

The first general election was held November 6, 1900, and the total vote cast was 58,515. Of this number, all but 148 votes were cast for Señor Degetau, the Republican candidate. The Federal candidate was Señor Gutell. The total registration for this election was a little less than 120,000. It was reported that the Federals formally withdrew before the election, claiming that they had suffered injustice in the registration. This would account for the great disparity in the vote for the two candidates. Members for the lower legislative body were also elected. Governor Allen reported that the election was quiet and orderly.

The Porto Rican Tariff.— When Porto Rico passed into the possession of the United States, her free trade with Spain was cut off, and the tariff laws of the United States prevented free trade with this country. Then, too, no goods could be brought into Porto Rico except that they paid the tariff rates existing in the United States. This proved to be a most serious drawback to the island, and in his message to congress December 5, 1899, President McKinley recommended that the markets of the United States be opened up to Porto Rican products. He said; "Our plain duty is to abolish all customs tariffs between the United States and Porto Rico and give her products free access to our markets." Bills were introduced into both branches of congress early in January, providing for free trade with Porto Rico. Gov-

During the month of January, however, the sentiment of the majority seems to have changed; it was stated that the bills were prompted by a misunderstanding, and that revenues in excess of the amount to be raised by local taxation were needed for the support of the island. It was then proposed that the rate of tariff be reduced to 25 per cent of the Dingley tariff rates. The question of the status of Porto Rico as a part of the United States then came up, and the Ways and Means committee of the house, as a necessary preliminary to the consideration of a tariff law for Porto Rico, declared that the constitution and laws of the United States do not extend over Porto Rico and the other island possessions. A bill was then presented imposing a tariff equal to 25 per cent of the existing United States tariff. The debate on this bill was sharp, and continued in the house until February 28, when upon the call for amendments, Mr. Payne of New York offered an amendment making the rate of duty on imports from Porto Rico 15 per cent of the rates provided by the Dingley law, instead of 25 per cent as provided by the pending bill. This amendment was adopted without division. Mr. Payne then proposed an additional section to the bill, as follows: "This act shall be taken and held to be provisional in its purposes and intending to meet a pressing need for revenue for the island of Porto Rico, and shall not continue in force after March 1, 1902." This section was adopted. The bill was put upon its final passage April 11, and was carried by a vote of 172 to 160 — not voting, 21. In the senate the tariff bill was attached to the Foraker bill,

providing for a civil government in Porto Rico. Early in 1901 a fair and equitable tax law was enacted by the Porto Rican legislature. In July the legislature informed the President of the United States that suitable tax laws were in successful operation, and that the revenue derived from customs was no longer needed. They requested that the tariff be withdrawn on July 25th. From that date Porto Rico has enjoyed free trade with this country.

Status of the Island.—As noted before, the discussion of the tariff brought up the question of the relation of our new possessions to the United States. The majority held that the term "United States" means the States constituting the Federal Union, but does not cover the territory belonging to the United States; also the power of congress with respect to legislation for the territories is plenary. The minority position was that the term "United States" designates the whole or any particular portion of the American empire. Of course this was a matter which would require the decision of the supreme court of the United States to settle finally. Two classes of cases were brought before the court, one denying the right of the U. S. to collect customs duties after the treaty of Paris was signed, and the other denying the right to collect duties under the Foraker act. In the first instance the supreme court on May 27, 1901, decided against the government on the ground that as soon as the treaty of Paris was signed, Porto Rico ceased to be "foreign territory," and therefore our customs duties on imports from foreign countries could not be levied upon goods brought from Porto Rico. In the second case the government was sustained. The court held "that Porto Rico is a territory appurtenant to and belonging to the United States, but not a part of the United States, within the revenue clause of the constitution; that the Foraker act is constitutional so far as it imposes duties upon imports from such island." This decision plainly gives to congress plenary powers to govern the island as may seem best.

Port Royal, a fortified town on the s.e. coast of Jamaica, on a tongue of land, forming the south side of the harbor of Kingston. Its harbor is a station for British ships of war, and it contains the naval arsenal, hospital, etc. It has been often damaged by earthquakes. Pop. 14,000.

Portsmouth, Rockingham co., N. H., on Piscataqua River. Railroads: Boston & Maine, and C. & M. Industries: cotton mills, shoe shops, and shipyards. It has a fine harbor, and large coastwise and foreign commerce. A U. S. navy yard is situated here. Pop. 1900, 10,637.

Portsmouth, Norfolk co., Va., on Elizabeth River, 1 mi. s.w. of Norfolk. Railroads: Seaboard & Roanoke, and Norfolk & Carolina. Steamers to Baltimore. Industries: Railroad shops and other manufactures. It exports large quantities of cotton, lumber, pig iron, naval stores, etc. A U. S. navy yard is situated near here. Pop. 1900, 17,427.

Portsmouth, county seat of Scioto co., O., 100 m. s. of Columbus; at the junction of the Scioto and Ohio rivers; at the terminus of the Ohio and Erie Canal, and on the B. & O. Southwestern, the Norfolk & Western, and the Cinn., Ports. & Va. railroads. Portsmouth is in a rich agricultural and mineral region. It has a large trade by river and canal and is noted for its iron and steel works. Other industries are flour and lumber mills, shoe factories, distilleries, fire-brick plants, furniture and veneer works and foundries. It is the seat of the Ohio Military Academy. Pop. 1900, 17,870.

Por'tugal, a kingdom in the southwest of Europe, forming the west part of the Iberian Peninsula; bounded e. and n. by Spain, and w. and s. by the Atlantic; greatest length, north to south, 345 mi.; greatest breadth, 140 mi. It is divided into seven provinces; Minho, Trazos-Montes, Beira, Estremadura, Alemtejo, and Algarve, with a total area of 34,462 sq. mi., and a pop. of 4,306,554. Add to these the Azores (921 sq. mi.; pop. 269.401), and Madeira (315 sq. mi.; pop. 132,223), which gives a grand total of 35,698 sq. mi., and a pop. of 4,708,178. The colonial possessions of Portugal consist of—in Asia—Goa, Salsette, Damaun, and Diu, all in Hindustan, Macao in China, and possessions in the Indian Archipelago, having together an area estimated at 7,923 sq. mi., and a pop. est. at 847,503; in Africa —Cape Verd, St. Thomas, and Prince's Islands, the Guinea settlements, Angola (Congo, Benguela, Mossamedes), Mozambique, and dependencies, with an aggregate of 697,335 sq. mi., and an est. pop. of 4,141,448. The total area of the Portuguese possessions therefore amounts to 909,824 sq. mi.; the pop. 5,518,000.

Physical Features.—Portugal is only partially separated from Spain by natural boundaries. Its shape is nearly that of a parallelogram. The coast line, of great length in proportion to the extent of the whole surface, runs from the north in a general s.s.w. direction till it reaches Cape St. Vincent, where it suddenly turns east. It is occasionally bold, and rises to a great height; but the far greater part is low and marshy, and not infrequently lined by sands and reefs, which make the navigation dangerous. The only harbors of importance, either from their excellence or the trade carried on at them, are those of Lisbon, Oporto, Setubal, Faro, Figueira, Aveiro, and Vianna. The interior is generally mountainous, a number of ranges stretching across the country, forming a succession of independent river basins, while their ramifications form the water-sheds of numerous subsidiary streams, and enclose many beautiful valleys. The loftiest range is the Serra do Estrella, a continuation of the central chain stretching across Spain, which attains the height of 7,524 ft. The nucleus of the mountains is usually granite, especially in the north and middle. The minerals include lead, iron, copper, manganese, cobalt, bismuth, antimony, marble, slate, salt, saltpeter, lithographic stones, millstones, and porcelain earth.

Climate and Productions.—The climate is greatly modified by the proximity of the sea and the height of the mountains. In general the winter is short and mild, and in some places never completely interrupts the course of vegetation. Early in February vegetation is in full vigor; during the month of July the heat is often extreme, and the country assumes, particularly in its lower levels, a very parched appearance. The drought generally continues into September; then the rains begin, and a second spring unfolds. Winter begins at the end of November. In the mountainous districts the loftier summits obtain a covering of snow, which they retain for months; but south of the Douro, and at a moderate elevation, snow does not lie long. The mean annual temperature of Lisbon is about 56°. Few countries have a more varied flora than Portugal. The number of species has been estimated to exceed 4,000, and of these more than 3,000 are phanerogamous. Many of the mountains are clothed with forest trees, among which the common oak and the cork oak are conspicuous. In the central provinces chestnuts are prevalent; in the south both the date and the American aloe are found; while in the warmer districts the orange, lemon, and olive are cultivated with success. The mulberry affords food for the silkworm, and a good deal of excellent silk is produced. The vine, too, is cultivated, and large quantities of wine are sent to Britain (especially port wine), and also to France, being in the latter country converted into Bordeaux wine. Agriculture generally, however, is at a low ebb, and in ordinary years Portugal fails to raise cereals sufficient to meet its own consumption. Among domestic animals raised are mules of a superior breed, sheep, goats, and hogs; but up to a very few years ago little attention was paid to their improvement. In consequence of recent reforms, however, there has been a marked improvement in most branches of industry. More horned cattle have been raised and of a better quality, and live stock now figures with timber and wine among the chief exports. The fisheries, so long neglected, have also been revived in recent years.

Manufactures, Industry, etc.—Manufactures are of limited amount, although they have been increasing of late years. They embrace woolens, cottons, silks, earthenware and porcelain, soap, paper, iron goods, hats, etc. The principal exports are wine, cork, cattle, timber, olive oil, fruits, iron and copper pyrites, and wool; the principal imports are cereals, salt provisions, colonial produce, woolen, cotton, linen, and silk tissues, iron, steel, and other metals, and coal. The bulk of the trade is with Great Britain, France, and Brazil. The French metric system of weights and measures was introduced into Portugal between 1860 and 1863.

Government, etc.—The crown is hereditary both in the male and female line. The constitution recognizes four powers in the state—the legislative, executive, judicial, and moderating. The last is vested in the sovereign. There are two chambers, the Chamber of Peers and the Chamber of Deputies. In 1885 a law was passed abolishing hereditary peerages by a gradual process. All laws relating to the army and taxation must originate in the Chamber of Deputies. While the established religion is the Roman Catholic, other religions are tolerated. Conventual establishments were suppressed in 1834. Education, under a distinct ministry, is compulsory; but the law is not enforced, and the general state of education is low. The army, consisting of 30,000 men on the peace footing, is raised both by conscription and enlistment. The navy numbers thirty-five steamers with 136 guns, thirteen sailing vessels, and a customs gunboat, and three training ships.

History.—The Phœnicians, Carthaginians, and Greeks early traded to this part of the peninsula, the original inhabitants of which are spoken of as Lusitanians, the country being called Lusitania. It was afterward conquered by the Romans, who introduced into it their own civilization. The country was afterward inundated by Alans, Suevi, Goths, and Vandals, and in the eighth century (712) was conquered by the Saracens. When the Spaniards finally wrested the country between the Minho and the Douro from Moorish hands, they placed counts or governors over this region. Henry the Younger of Burgundy, grandson of Hugh Capet, came into Spain about 1090, to seek his fortune in the wars against the Moors. Alphonso VI gave him the hand of his daughter, and appointed him (1095) count and governor of the provinces Entre Douro e Minho, Traz-os-Montes, part of Beira, etc. The count, who owed feudal services to the Castilian kings, was permitted to hold in his own right whatever conquests he should make from the Moors beyond the Tagus (1112). Henry's son, Alphonso I, defeated Alphonso, king of Castile, in 1137, and made himself independent. In 1139 he gained the brilliant victory of Ourique over the Moors, and was saluted on the field King of Portugal. The cortes convened by Alphonso in 1143 at Lamego confirmed him in the royal title, and in 1181 gave to the kingdom a code of laws and a constitution. Alphonso extended his dominions to the borders of Algarve, and took Santarem in 1143. The capture of Lisbon (1147) which was effected by the aid of some English Crusaders and others, was one of the most brilliant events of his warlike life. The succeeding reigns from Alphonso I to Dionysius (1279) are noteworthy chiefly for the conquest of Algarve (1251) and a conflict with the pope, who several times put the kingdom under interdict. Dionysius's wise encouragement of commerce, agriculture, manufacturers, and navigation laid the foundation of the future greatness of Portugal. He liberally patronized learning, and founded a university at Lisbon, transferred in 1308 to Coimbra. By these and other acts of a wise and beneficent administration he earned the title of *father of his country*. He was succeeded by Alphonso IV, who in conjunction with Alphonso II of

Castile defeated the Moors at Salado in 1340. He murdered Inez de Castro, the wife of his son Pedro (1355) (see *Inez de Castro*), who succeeded him. Dying in 1367, Pedro I was succeeded by Ferdinand, on whose death in 1383 the male line of the Burgundian princes became extinct. His daughter Beatrice, wife of the King of Castile, should have succeeded him, but the Portuguese were so averse to a connection with Castile that John I, natural son of Pedro, grand-master of the order of Avis (founded in 1162), was saluted king by the estates. In 1415 he took Ceuta, on the African coast, the first of a series of enterprises which resulted in those great expeditions of discovery on which the renown of Portugal rests. In this reign were founded the first Portuguese colonies, Porto Santo (1418), Madeira (1420), the Azores (1433), and those on the Gold Coast. The reigns of his son Edward (1433–38) and his grandson Alphonso V were less brilliant than that of John I; but the latter was surpassed by that of John II (1481–95), perhaps the ablest of Portugal rulers. In his reign began a violent struggle with the nobility whose power had become very great under his indulgent predecessors. The expeditions of discovery were continued with ardor and scientific method. Bartolommeo Diaz doubled the Cape of Good Hope in 1487, and Vasco da Gama reached India in 1498. In 1500 Cabral took possession of Brazil.

While these great events were still in progress John II was succeeded by his cousin Emanuel (1495–1521). The conquests of Albuquerque and Almeida made him master of numerous possessions in the islands and mainland of India, and in 1518 Lope de Soares opened a commerce with China. Emanuel ruled from Babelmandeb to the Straits of Malacca, and the power of Portugal had now reached its height. In the reign of John III, son of Emanuel (1521–57), Indian discoveries and commerce were still further extended; but the rapid accumulation of wealth through the importation of the precious metals, and the monopoly of the commerce between Europe and India, proved disadvantageous to home industry. The wisdom which had hitherto so largely guided the counsels of the kings of Portugal now seemed to forsake them. The Inquisition was introduced (1536), and the Jesuits were admitted (1540). Sebastian, the grandson of John III, who had introduced the Jesuits, having had his mind inflamed by them against the Moors of Africa, lost his life in the battle against these infidels (1578), and left his throne to the disputes of rival candidates, of whom the most powerful, Philip II of Spain, obtained possession of the kingdom by the victory of Alcantara. The Spanish yoke was grievous to the Portuguese, and many efforts were made to break it; but the power of Philip was too great to be shaken. Portugal continued under the dominion of Spain till 1640, and her vast colonial possessions were united to the already splendid acquisitions of her rival. But these now began to fall into the hands of the Dutch, who, being provoked by

hostile measures of Philip, attacked the Portuguese as well as the Spanish possessions both in India and America. They deprived the Portuguese of the Moluccas, of their settlements in Guinea, of Malacca, and of Ceylon. They also acquired about half of Brazil, which, after the re-establishment of Portuguese independence, they restored for a pecuniary compensation. In 1640, by a successful revolt of the nobles, Portugal recovered her independence, and John IV, duke of Braganza, reigned till 1656, when he was succeeded by Alphonso VI. Alphonso ceded Tangier and Bombay to England as the dowry of his daughter, who became the queen of Charles II, Pedro II, who deposed Alphonso VI, concluded a treaty with Spain (1668), by which the independence of the country was acknowledged.

During the long reign of John V (1706–50) some vigor was exerted in regard to foreign relations, while under his son and successor Joseph I (1750–77) the Marquis of Pombal, a vigorous reformer such as Portugal required, administered the government. On the accession of Maria Francisca Isabella, eldest daughter of Joseph, in 1777, the power was in the hands of an ignorant nobility and a not less ignorant clergy. In 1792, on account of the sickness of the queen, Juan Maria José, prince of Brazil (the title of the prince royal until 1816), was declared regent. His connections with England involved him in war with Napoleon; Portugal was occupied by a French force under Junot, and the royal family fled to Brazil. In 1808 a British force was landed under Wellington, and after some hard fighting the decisive battle of Vimeira took place (August 21), which was followed by the Convention of Cintra and the evacuation of the country by the French. The French soon returned, however; but the operations of Wellington, and in particular the strength of his position within the lines of Torres Vedras, forced them to retire. The Portuguese now took an active part in the war for Spanish independence. On the death of Maria in 1816, John VI ascended the throne of Portugal and Brazil, in which latter country he still continued to reside. The absence of the court was viewed with dislike by the nation, and the general feeling required some fundamental changes in the government. A revolution in favor of constitutional government was effected without bloodshed in 1820, and the king invited to return home, which he now did. In 1822 Brazil threw off the yoke of Portugal, and proclaimed Dom Pedro, son of John VI, emperor. John VI d. in 1826, having named the Infanta Isabella Maria regent. She governed in the name of the emperor of Brazil, Dom Pedro IV of Portugal, who granted a new constitution, modeled on the French, in 1826. In this year he abdicated the Portuguese throne in favor of his daughter Maria da Gloria, imposing on her the condition of marrying her uncle Dom Miguel, who was intrusted with the government as regent; but the absolutist party in Portugal set up the claim of Dom Miguel to an unlimited sovereignty, and a

revolution in his favor placed him on the throne in 1828. In 1831 Dom Pedro resigned the Brazilian crown, and returning to Europe succeeded in overthrowing Dom Miguel, and restoring the crown to Maria in 1833, dying himself in 1834. In 1836 a successful revolution took place in favor of the restoration of the constitution of 1820, and in 1842 another in favor of that of 1826. Maria d. in 1853. Her husband, Ferdinand of Saxe-Coburg (Dom Ferdinand II), became regent for his and her son, Pedro V, who himself took the reins of government in 1855. Pedro d. in 1861, and was succeeded by his brother, Louis I. Louis d. in 1889, and was succeeded by his son, Carlos I. During these latter reigns the state of Portugal has generally been fairly prosperous and progressive. The relations between Britain and Portugal have generally been very friendly, but Portuguese encroachments on territory under British protection in Southeast Africa provoked an emphatic protest from Britain in 1889–90, and a rupture was even threatened for a time.

Language and Literature.—The differences between Portuguese and Spanish languages are of comparatively modern origin, the two languages being very nearly alike in the time of Alphonso I. The dialect of Spanish spoken in Portugal at the beginning of the monarchy was the Galician, which was also that of the court of Leon; but that court subsequently adopted the Castilian, which became the dominant language of Spain. The decline of the Galician dialect in Spain, and the formation of the Portuguese language, finally determined the separation of Spanish and Portuguese, and from cognate dialects, made them distinct languages. Portuguese is considered to have less dignity than the Spanish, but is superior to it in flexibility. In some points of pronunciation it more resembles French than Spanish. It is also the language of Brazil. The oldest monuments of Portuguese literature do not go back further than the twelfth and thirteenth centuries, and the native literature could then boast of nothing more than popular songs. The first Portuguese collection of poetry was made by King Dionysius, and was published under the title of *Cancioneiro del Rey Dom Diniz.* Some poems on the death of his wife are attributed to Pedro I, husband of Inez de Castro. The sons and grandsons of John I were poets and patrons of the troubadours. *Sà de Miranda* marks the transition from the fifteenth to the sixteenth century, and the separation of the Portuguese from the other Spanish dialects, and from the language of the troubadours. The sixteenth century is the classic era of Portuguese literature. The chief names are Sâ de Miranda, Antonio Ferreira, Camoens, Diego Bernardes, Andrade Caminha, and Alvares do Oriente. The principal epic and the greatest poem in the Portuguese literature, almost the only one which has acquired a European reputation, is *Os Lusiadas* (the Portuguese) of Camoens (1524–80), which has placed its writer in the rank of the few great poets of the highest class whose genius is universally recognized. After Camoens as an epic writer, comes Cortereal, who has celebrated the siege of Diù, and the shipwreck of Sepulveda. Vasco de Lobeiro, Francisco Moraes, and Bernardim Ribeiro, are among the leading romance writers. The drama also began to be cultivated in the sixteenth century. Sà de Miranda studied and imitated Plautus. Ferreira composed the first regular tragedy, *Inez de Castro.* Camoens wrote several theatrical pieces, among which are *Amphitryon*, and *Seleucus.* Barros, also a romance writer, wrote a *History of the Conquest of India. The Commentaries of Alphonso d'Albuquerque,* by a nephew of the conqueror; the *Chronicle of King Manuel and of Prince John,* by Damian de Goes; the *History of the Discovery and Conquest of the Indies,* by Lopès de Castanheda; the *Chronicle of King Sebastian,* by Diego Bernardo Cruz, are all works of merit. By the opening of the seventeenth century Portugal's literary greatness had been succeeded by one of great activity, though of little real power. A crowd of epics were stimulated into being by the success of the *Lusiad.* During this period the native drama became almost extinct, being overshadowed by the Spanish. In the eighteenth century the influence of the French writers of the age of Louis XIV so completely dominated Portuguese literature that it became almost entirely imitative. Toward the close of this century two writers appeared who have formed schools, Francisco Manoel do Nascimento (1734–1829), an elegant lyrist, and Barbosa du Bocage, who introduced an affected and hyperbolical style of writing. Among more recent poets possessing some claim to originality may be mentioned Mouzinho de Albuquerque, Feliciano Castilho, Herculano de Carvalho, Almeida Garrett, and Thomas Ribeiro; among novelists are Carvalho, Garrett, Julio Diniz, and Rebello de Silva. Through the efforts of these and others Portuguese literature has again begun to assume an aspect of native vigor. In art, Portugal has never distinguished herself.

Port Wine is a very strong, full-flavored wine produced in the upper valley of the Douro, Portugal, and has its name from the place of shipment, Oporto. It is slightly astringent, and has a color varying from pink to red. It requires three or four years to mature, and with age becomes tawny; it receives a certain proportion of spirit to hasten the process of preparation. The vintage begins early in September and extends into October. The port wine trade was established in 1678. The total annual production is put at from 110,000 to 120,000 pipes, of which at present 40,000 are on an average exported. Since 1876 the vineyards of the Douro have suffered greatly from the phylloxera. Large quantities of artificial port are made in the U. S.

Poseidōn (po-sī′dōn), the Greek god of the sea, identified by the Romans with the Italian deity Neptunus. A son of Kronos and Rhea, and hence a brother of Zeus, Hēra, and Dēmētēr, he was regarded as only inferior in power to Zeus. His usual residence was in the depths of the sea near Ægæ, in Eubœa, and the at-

tributes ascribed and most of the myths regarding him have reference to the phenomena of the sea. The horse, and more particularly the war horse, was sacred to Poseidōn, and one of the symbols of his power. During the Trojan War Poseidōn was the constant enemy of Troy, and after its close he is described as thwarting the return of Ulysses to his home for his having killed Polyphēmus, a son of the god. Poseidōn was married to Amphitritē. His worship was common throughout Greece and the Greek colonies, but especially prevailed in the maritime towns. The Isthmian games were held in his honor. In works of art Poseidōn is represented with features resembling those of Zeus, and often bears the trident in his right hand. A common representation of him is as drawn in his chariot over the surface of the sea by hippocamps (monsters like horses in front and fishes behind) or other fabulous animals.

Posen, a fortified town in Prussia, capital of the province of the same name and an archbishop's see, stands on the Warthe, 149 mi. e. by s. of Berlin. It is surrounded by two lines of forts, is built with considerable regularity, has generally fine wide streets, and numerous squares or open spaces. The most noteworthy public buildings are the cathedral, in the Gothic style (1775), the town parish church, a fine building in the Italian style, both Roman Catholic; the townhouse (1508), with a lofty tower; the Raczynski Library; the municipal archive building, etc. The manufactures consist chiefly of agricultural machines, manures, woolen and linen tissues, carriages, leather, lacquerware, etc. There are also breweries and distilleries. Pop. 68,315. The province is bounded by West Prussia, Russian Poland, Silesia, and Brandenburg; area 11,178 sq. mi. The surface is flat, and extensively occupied by lakes and marshes. A small portion on the northeast belongs to the basin of the Vistula, all the rest to the basin of the Oder. The soil is mostly of a light and sandy character, yielding grain, millet, flax, hemp, tobacco, and hops. Forests occupy 20 per cent. of the surface. The inhabitants include many Germans especially in the towns, but considerably more than half are Poles, Posen being one of the acquisitions which Prussia made by the dismemberment of Poland. It is divided into the governments of Posen and Bromberg. Pop. 1,715,618.

Positive Philosophy (or Positivism) is the name given by Auguste Comte to the philosophical and religious system promulgated by him. The distinguishing idea which lies at the root of this twofold system is the conception that the anomalies of our social system cannot be reformed until the theories upon which it is shaped have been brought into complete harmony with science. The leading ideas of Comte's philosophy are 1, the classification of the sciences in the order of their development, proceeding from the simpler to the more complex—mathematics, astronomy, physics, chemistry, biology, and sociology; and 2, the doctrine of the "three stages," or the three aspects in which the human mind successively views the world of phenomena, namely, the theological, the metaphysical, and the scientific. This theory of the three stages, one of the most characteristic of Comte's system, is thus stated by George Henry Lewes:—

"Every branch of knowledge passes successively through three stages: 1, the *supernatural* or fictitious; 2, the *metaphysical* or abstract; 3, the *positive* or scientific. The first is the necessary point of departure taken by human intelligence; the second is merely a stage of transition from the supernatural to the positive; and the third is the fixed and definite condition in which knowledge is alone capable of progressive development. In the *supernatural* stage the mind seeks after *causes;* aspires to know the *essences* of things and their modes of operation. It regards all effects as the productions of supernatural agents, whose intervention is the *cause* of all the apparent anomalies and irregularities. Nature is animated by superhuman beings. Every unusual phenomenon is a sign of the pleasure or displeasure of some being adored and propitiated as a god. In the metaphysical stage, which is only a modification of the former, but which is important as a transitional stage, the supernatural agents give place to abstract forces (personified abstractions) supposed to inhere in the various substances, and capable themselves of engendering phenomena. The highest condition of this stage is when all these forces are brought under one general force named nature. In the positive stage the mind, convinced of the futility of all inquiry into causes and essences, applies itself to the observation and classification of laws which regulate effects; that is to say, the invariable relations of succession and similitude which all things bear to each other. The highest condition of this stage would be to be able to represent all phenomena as the various particulars of one general view."

The religious side of positivism has somewhat the nature of an apology or after-thought. After doing away with theology and metaphysics, and reposing his system on science or positive knowledge alone, Comte discovered that there was something positive in man's craving for a being to worship. He therefore had recourse to what he calls the cultus of humanity considered as a corporate being in the past, present, and future, which is spoken of as the *Grand Être.* This religion, like other forms of worship, requires for its full development an organized priesthood, temples, etc. Under the régime of positive religion Comte would include the political and social side of his system. Hence some of his followers look forward to the establishment of an international republic, composed of the five great Western nations of Europe, destined ultimately to lead the whole world. Society in this great commonwealth will be reorganized on the basis of a double direction or control, that of the temporal or material authority, and t at of the spiritual or educating body.

Among leading thinkers of the last genera-

tion Comte's adherents included such intellects as George Henry Lewes, John Stuart Mill, Richard Congreve, Harriet Martineau, and others. Later investigators, however, have not sustained the favorable verdict of those who judged from a nearer mental perspective. The critiques of Herbert Spencer, Professor Huxley, John Fiske, and Dr. McCosh are especially important; also the reply of M. Littré, the foremost French disciple of Comte, to Mill's elaborate critique of positivism.

Pos'se Comita'tus, in law, "the power of the county," that is, the citizens who are summoned to assist an officer in suppressing a riot or executing any legal process.

Postmaster General, the chief officer of the Post Office Department of the executive branch of the government of the U. S. His duties are to establish post offices and appoint postmasters, and, generally, to superintend the business of the department in all the duties assigned to it.

Post Office, a department of the government of a country charged with the conveyance of letters, newspapers, parcels, etc. From the time of Cyrus the Elder down to the Middle Ages various rulers had concocted more or less effective systems of postal communication throughout their dominions; but the "post" as we know it to-day is an institution of very modern growth. The beginnings of a postal service in the U. S. date from 1639, when a house in Boston was employed for the receipt and delivery of letters for or from beyond the seas. In 1672 the government of New York colony established "a post to goe monthly from New York to Boston;" in 1702 it was changed to a fortnightly one. A general post office was established and erected in Virginia in 1692, and in Philadelphia in 1693. A deputy postmaster general for America was appointed in 1692; and by act of Parliament in 1710 he was directed to keep his principal office in New York, "and other chief offices in some convenient place or places in other of Her Majesty's provinces or colonies in America;" a monopoly was established which included also the transport of travelers, and a tariff was fixed. The system, however, proved a failure, until 1753, when Benjamin Franklin became postmaster general; when he was removed from office in 1774 the net revenue exceeded $15,000.

In 1789, when the post office was transferred to the new federal government, the number of offices in the thirteen states was only about seventy-five. A conspectus of the remarkable progress in the ensuing century is supplied in the table below. Outstanding events in the history of the American postal service have been the negotiation of a postal treaty with England (1846); the introduction of postage stamps (1847); of stamped envelopes (1852), of the system of registering letters (1855); the establishment of the free delivery system, and of the traveling post office system (1863); the introduction of the money order system (1864), of postal cards (1873), and, between the last two dates, of stamped newspaper wrappers, and of envelopes bearing requests for the return of the enclosed letter to the writer in case of non-delivery; the formation of the Universal Postal Union (1873); the issue of "postal notes" payable to bearer (1883); and the establishment of a special delivery system (1885), under which letters bearing an extra ten cent stamp are delivered by special messengers immediately on arrival. The postmaster general is a member of the cabinet. Under him about 100,000 persons are employed, of whom some 76,000 are postmasters. Most of these, except letter-carriers and clerks, are liable to be removed on the accession to federal office of a new political party. The following table shows the increase, by decades, during the department's history, in offices, length of mail routes in miles, revenue, etc.:—

Years.	Offices.	Miles.	Revenue.	Expenditure.
1790	75	1,875	$37,935	$32,140
1800	903	20,817	280,804	213,994
1810	2,300	36,406	552,366	495,969
1820	4,500	72,492	1,111,927	1,160,926
1830	8,450	115,176	1,850,583	1,932,708
1840	13,468	155,739	4,543,522	4,718,236
1850	18,417	178,672	5,552,971	5,212,953
1860	28,498	240,954	8,518,067	19,170,610
1870	28,492	231,232	19,772,221	23,998,837
1880	42,989	343,888	33,315,479	36,542,804
1890	62,401	..	60,858,783	66,645,083
1900	76,688	500,982	102,354,579	107,740,268

As will be seen, the U. S. post office department is carried on at a loss; this is due to the large amount of postal matter of certain classes carried at less than the cost of conveyance and distribution.

The number of post offices in the U. S. is larger than in any other country. It provides a post office to every 1,003 persons. All mail matter is divided into four classes. The first class includes letters, postal cards, and anything closed against inspection: postage, 2 cents each oz. or additional fraction of an oz.; postal cards, 1 cent; registered letters, 10 cents in addition to postage. Second class matter includes all newspapers, periodicals, etc., issued as frequently as four times a year: postage, 1 cent per. lb. or fraction thereof. When the newspapers, etc., are sent by persons other than the publishers, the charge is 1 cent for each four oz. Mail matter of the third class includes books, circulars, proof sheets, etc.: postage, 1 cent for each 2 ozs.; limit of weight, 4 lbs. each package. The fourth class embraces merchandise and all matters not included in the other three classes: postage 1 cent per. oz.; limit of weight, 4 lbs. Prepayment of postage by stamps for all classes of matter is required.

Larceny in relation to the post office is punished with great severity. Every person employed under the post office who wrongfully opens or detains a letter, or is accessory thereto, is liable to be punished by fine or imprisonment, or both. If he embezzle, secrete, or destroy a letter, he is guilty of felony, and is liable to penal servitude.

Post-tertiary, in geology, the Lyellian term for all deposits and phenomena of more recent date than the Norwich or mammaliferous

crag. It may be restricted so as only to include accumulations and deposits formed since the close of the glacial or boulder drift systems, and has been divided into three sections —*historic*, *prehistoric*, and *post-glacial*. The first comprises the peat of Great Britain and Ireland, fens, marshes, river deposits, lake silts, accumulations of sand drift, etc., containing human remains, canoes, metal instruments, remains of domestic animals, etc. The *prehistoric* comprises similar, or nearly similar deposits, but the remains found in them are older, comprising stone implements, pile dwellings, and extinct animals, as the Irish deer, mammoth, etc. To the *post-glacial* belong raised beaches with shells of a more boreal character than those of existing seas, the shell-marl under peat, many dales and river valleys, as well as the common brick clay, etc., covering submarine forests or containing the remains of seals, whales, the mammoth, rhinoceros, urus, hyena, hippopotamus, etc.

Postulate, a position or supposition assumed without proof, being considered as self-evident, or too plain to require illustration. In geometry, the enunciation of a self-evident problem. Euclid has constructed his elements on the three following postulates: 1, Let it be granted that a straight line may be drawn from any one point to any other point; 2, That a terminated straight line may be produced to any length in a straight line; 3, That a circle may be described from any center at any distance from that center.

Potash (or Potassa), an alkaline substance obtained from the lye of vegetable ashes which is mixed with quicklime and boiled down in iron pots, and the residuum ignited, the substance remaining after ignition being common potash. It derives its name from the *ashes* and the *pots* (called potash kettles) in which the lixivium is (or used to be) boiled down. An old name was *vegetable alkali*. Potash in this crude state is an impure carbonate of potassium, which, when purified, is known in commerce as *pearlash*. It is used in the making of glass and soap, and large quantities of it are now produced from certain "potash minerals" (especially carnallite), instead of from wood ashes. What is known as *caustic potash* is prepared from ordinary potash. It is solid, white, and extremely caustic, *eating* into animal and vegetable tissues with great readiness. It changes the purple of violets to green, restores reddened litmus to blue, and yellow turmeric to reddish-brown. It rapidly attracts humidity from the air, and becomes semi-fluid. It is fusible at a heat of 300°, and is volatilized at low ignition.

Potas'sium, a name given to the metallic basis of potash, discovered by Davy in 1807, and one of the first fruits of his electro-chemical researches; symbol, K; atomic weight, 39.1. Next to lithium it is the lightest metallic substance known, its specific gravity being 0.865 at the temperature of 60°. At ordinary temperatures it may be cut with a knife and worked with the fingers. At 32° it is hard and brittle, with a crystalline texture; at 50° it becomes malleable, and in luster resembles polished silver; at 150° it is perfectly liquid. Potassium has a very powerful affinity for oxygen, which it takes from many other compounds. A freshly-exposed surface of potassium instantly becomes covered with a film of oxide. The metal must therefore be preserved under a liquid free from oxygen, rock-oil or naphtha being generally employed. It conducts electricity like the common metals. When thrown upon water it decomposes that liquid with evolution of hydrogen, which burns with a pale violet flame, owing to the presence in it of potash vapor. *Chloride* of potassium is known in commerce as "muriate of potash," and closely resembles common salt. It is obtained from potassic minerals, the ashes of marine plants and from sea water or brine springs. It enters into the manufacture of saltpeter, alum, artificial manures, etc.

Potato, a plant belonging to the natural order Solanaceæ, which also includes such poisonous plants as nightshade, henbane, thorn-apple, and tobacco. We owe this esculent to western South America, where it still grows wild chiefly in the region of the Andes, producing small, tasteless, watery tubers. The potato was first introduced into Europe by the Spaniards after the conquest of Peru, by whom it was spread over the Netherlands, Burgundy, and Italy before the middle of the sixteenth century. In the course of the eighteenth century it became a favorite article of food with the poorer classes in Germany; but in France there existed so violent a prejudice against it that it did not come into general use until toward the end of the century. The potato is a perennial plant, with angular herbaceous stems, growing to the height of 2 or 3 ft.; leaves, pinnate; flowers pretty large, numerous, disposed in corymbs, and colored violet, bluish, reddish, or whitish. The fruit is globular, about the size of a gooseberry, reddish-brown or purplish when ripe, and contains numerous small seeds. The tubers, which furnish so large an amount of the food of mankind, are really underground shoots abnormally dilated, their increase in size having been greatly fostered by cultivation. Their true nature is proved by the existence of the "eyes" upon them. These are leaf buds, from which, if a tuber, or a portion of it containing an eye is put into earth, a young plant will sprout, the starchy matter of the tuber itself supplying nutriment until it throws out roots and leaves, and so attains an independent existence. The potato succeeds best in a light sandy loam containing a certain proportion of vegetable matter. The varieties are very numerous, differing in the time of ripening, in their form, size, color, and quality. New ones are readily procured by sowing the seeds, which will produce tubers the third year, and a full crop the fourth. But the plant is usually propagated by sowing or planting the tubers, and it is only in this way that any one variety can be kept in cultivation. Potatoes are extensively used as a cattle food, and starch is also manufac-

tured from them. In Maine, Vermont, and Northern New York this is an important industry. Enormous crops of this valuable esculent are grown in the U. S.

Potemkin (pot-yom'kin), GREGORY ALEXANDROVITCH (1736–1791), Russian general, a favorite of the Empress Catharine II. He gained the entire confidence of Catharine, and became her avowed favorite. From 1776 till his death, a period of more than fifteen years, he exercised a boundless sway over the destinies of the nation.

Pot Metal, an inferior kind of brass (copper, 10 parts; lead, 6 to 8), used for making various large vessels employed in the arts. Also a kind of stained glass in which the colors are incorporated with the substance by being added while the glass is in a state of fusion.

Poto'mac, a river which forms the boundary between Maryland and Virginia, passes Washington, and after a course of nearly 400 mi. flows into Chesapeake Bay, being about 8 mi. wide at its mouth. The termination of the tide water is at Washington, about 125 mi. from the sea, and the river is navigable for large ships all that distance. Above Washington are several falls which obstruct navigation.

Potsdam, a town in Prussia, capital of the province of Brandenburg, and the second royal residence of the kingdom, is charmingly situated in the midst of wooded hills, 17 mi. s.w. of Berlin, on the Havel, which here has several lakes connected with it. The principal edifices are the royal palace; Garrison Church; the Nikolai Church; the French Protestant Church; the townhouse; and the Barberini Palace. The palace of Sans Souci, a building of one story, was erected under direction of Frederick the Great; the grounds are finely laid out, and contain various fountains, etc., and an orangery 330 yards long. In the same neighborhood is the New Palace, a vast brick building exhibiting much gaudy magnificence. A third palace in the environs of the town is called the Marble Palace. Potsdam was an unimportant place till the Great Elector selected it as a place of residence and built the royal palace in the town (1660–71). Pop. 50,877.

Pottery, the art of forming vessels or utensils of any sort in clay. This art is of high antiquity, being practised among various races in prehistoric times. We find mention of earthenware in the Mosaic writings. The Greeks had important potteries at Samos, Athens, and Corinth, and attained great perfection as regards form and ornamentation. Demaratus, a Greek, the father of Tarquinius Priscus, king of Rome, is said to have instructed the Etruscans and Romans in this art. Glazed earthenware was long supposed to be of no older date than the ninth century of our era, and to have originated with the Arabs in Spain; but the discovery of glazed ware in Egypt, of glazed bricks in the ruins of Babylon, of enameled tiles and glazed coffins of earthenware in other ancient cities, proves that this is not the case. The Arabs, however, seem to be entitled to the credit of having introduced the manufacture of glazed ware into modern Europe. The Italians are said first to have become acquainted with this kind of ware as it was manufactured in the island of Majorca, and hence they gave it the name of *majolica.* They set up their first manufactory at Faenza in the fifteenth century. In Italy the art was improved, and a new kind of glaze was invented, probably by Luca della Robbia. The French derived their first knowledge of glazed ware from the Italian manufactory at Faenza, and on that account gave it the name of *faïence.* About the middle of the sixteenth century the manufactory of Bernard Palissy at Saintes in France became famous on account of the beautiful glaze and rich ornaments by which its products were distinguished. A little later the Dutch began to manufacture at Delft the more solid but less beautiful ware which thence takes its name. The principal improver of the potter's art in Britain was Josiah Wedgwood in the last century. Porcelain or chinaware first became known in Europe about the end of the sixteenth century through the Dutch, who brought it from the East.

Though the various kinds of pottery and porcelain differ from each other in the details of their manufacture, yet there are certain general principles and processes which are common to them all. The first operations are connected with the preparation of the potter's paste, which consists of two different ingredients, an earthy substance, which is the clay proper; and a siliceous substance, which is necessary to increase the firmness of the ware, and render it less liable to shrink and crack on exposure to heat. The clay is first finely comminuted, and reduced to the consistency of cream, when it is run off through a set of wire, gauze, or silk sieves into cisterns, where it is diluted with water to a standard density. The other ingredient of the potter's material is usually ground flints, or flint powder, as it is called. The flint nodules are reduced to powder by being heated and then thrown into water to make them brittle. They are then passed through a stamping mill and ground to fine powder; which, treated in much the same way as the clay, is finally passed as a creamy liquor into a separate cistern. These liquors are now mixed in such measure that the dry flint powder bears to the clay the proportion of one sixth or one fifth, or even more, according to the quality of the clay and the practise of the manufacturer. The mixture is then forced into presses, lined with cloth, by means of a force pump, the cloth retaining the clay and allowing the water to escape. The clay now forms a uniform inelastic mass, which is cut into cubical lumps and transferred to a damp cellar, where it remains until a process of fermentation or disintegration renders it finer in grain and not so apt to crack in the baking. But even after this process the ingredients composing the paste are not intimately enough incorporated together nor sufficiently fine in texture until another operation has been undergone, called *slapping* or *wedging*, which consists in repeatedly breaking the lumps across

and striking them together again in another direction, dashing them on a board, etc. This final process of incorporation is now most frequently performed by machinery.

In making earthenware vessels, if they are of a circular form, the first operation after the paste has been made is turning, or what is technically called *throwing* them on the wheel. This is an apparatus resembling an ordinary turning lathe, except that the surface of the *chuck*, or support for the clay, is horizontal instead of vertical. The chuck is in fact a revolving circular table, in the center of which a piece of clay is placed, which the potter begins to shape with his hands. The rotary motion of the table gives the clay a cylindrical form in the hands of the potter, who gradually works it up to the intended shape. It is then detached from the revolving table and dried, after which, if intended for finely-finished ware, it is taken to a lathe and polished. It is at this stage that the handles and other prominent parts are fitted on, which is done by means of a thin paste of clay called *slip*. The articles are now removed to a room in which they are dried more thoroughly at a high temperature. When they have reached what is called the *green* state they are again taken to a lathe and more truly shaped, as well as smoothed and burnished. When the articles are not of a circular form, and accordingly cannot be produced by means of the wheel, they are either pressed or cast in molds of plaster of Paris. In the former case the paste used is of the same consistence as that employed on the wheel; in the latter molds of the same sort are used, but the clay mixture is poured into them in the condition of slip. By the absorption of the water in the parts next the dry mold a crust is formed of greater or less thickness, according to the time that the liquid is allowed to remain. The molds are in two or more pieces, so as to be easily detached from the molded article.

When shaped and dried the articles are ready for the kiln, in which they are exposed to a high temperature until they acquire a sufficient degree of hardness for use. The paste of which the earthenware is composed is thus converted into what is called *bisque* or *biscuit*. While undergoing this process of baking the articles are enclosed in larger vessels of baked fire clay, called *saggers*, to protect them from the fire and smoke, and to distribute the heat more uniformly. The whole firing lasts from 40 to 42 hours. After the kilns have been allowed to cool very slowly, the articles are taken out, and if they are not to be decorated in color, and sometimes also when they are to be so decorated, they are immersed in a vitrifiable composition called *glaze*, which, after the vessels have a second time been subjected to heat in glazed saggers, is converted into a coating of glass, rendering the vessels impermeable to water.

These processes are all that are necessary to complete a plain earthenware vessel, but very frequently the vessels are adorned with printed or painted decorations executed in colors, such as may be burned into the substance of the article. There are two methods of printing on earthenware: press printing, which is done on the bisque, and bat printing, done on the glaze. In both cases an engraving is first executed in copper, and thence transferred, by means of a sheet of paper containing an impression, to the article requiring to be printed; but the processes are slightly different in detail. When the vessel has received its impression it is ready to be fired in the enamel kiln. Painting on earthenware is effected with a brush over the glaze.

All the numerous varieties of earthenware are made in the manner just described, with only slight modifications in the nature of the ingredients of their composition or the processes of manufacture. Stoneware may be formed of the clays which are used for other vessels, with the addition of different sorts of sand, and sometimes of cement. A greater degree of heat is applied than in the case of ordinary earthenware, and when some fluxing substance is added it has the effect of producing that state of semi-fusion which is the distinguishing quality of stoneware. A kind of semi-vitrified ware, first made by Wedgwood, takes its name from him. It is made of two different kinds of pastes, both very plastic. This ware is incapable of taking on a superficial glaze; but by a process called *smearing*, which is simply baking at a high heat in saggers coated internally with a glaze, acquires a remarkable luster.

Porcelain or chinaware is formed only from argillaceous minerals of extreme delicacy, united with siliceous earths capable of communicating to them a certain degree of translucency by means of their vitrification. Porcelain is of two kinds, hard and tender. Both consist, like other earthenwares, of two parts —a paste which forms the biscuit, and a glaze. The biscuit of hard porcelain is composed of kaolin or china clay, and of decomposed feldspar. The glaze consists of a feldspar rock reduced to a fine powder, and mixed with water, so as to form a milky liquid into which the articles are dipped after a preliminary baking. Tender porcelain biscuit is made of a vitreous frit, composed of siliceous sand or ground flints, with other ingredients added, all baked together in a furnace till half fused, and then reduced to a condition of powder. The glaze of tender porcelain is a specially prepared glass ground fine, and made into a liquid by mixing with water. The processes employed in manufacturing porcelain wares are very much the same as those used for other kinds of earthenware, but requiring more delicacy and care. The biscuit paste even of hard porcelain has so little tenacity compared with that of earthenware that it cannot easily be shaped on the wheel, and is consequently more frequently molded. The paste of tender porcelain is still less tenacious, so that the wheel cannot be used for it at all, and a little mucilage of gum or black soap must be added before it can be worked even in molds. During the baking, too, it becomes so soft that every

part of an article must be supported. Tender porcelain receives two coats of glaze.

Metallic oxides incorporated with some fusible flux, such as borax, flint, etc., are used for painting on porcelain. The colors are mixed with essential oils and turpentine, and applied by means of a camel's-hair brush. When the painting is finished the vessels are baked in a peculiar kind of ovens called *muffles*, which are also used for fixing the printed figures on the glaze of stoneware. By the operation of the furnace most of the colors employed in painting porcelain become quite different, and the change which takes place in them is usually through a series of tints, so that the proper tint will not be obtained unless the baking is stopped precisely at the proper time. Sometimes porcelain has designs etched on it by means of fluoric acid. Sculptures also are executed by casting in moulds in various kinds of porcelain, called statuary porcelain, Parian, Carrara, etc.

Pottinger (pot'in-jėr), Eldred (1811–1856), British officer, famed for his defense of Herat in 1838, was b. in Ireland. In 1837 he traversed Afghanistan in disguise, and reached Herat after many risks. The city was then held by an Afghan prince, and was besieged by the Persians for nearly a year, when it was relieved by a British diversion in the Persian Gulf. The credit of the defense was given to Pottinger. Major Pottinger took a leading part in the disastrous Afghan war of 1841–42, and as political agent had to sign terms with the rebels, which were afterward repudiated by Lord Ellenborough. A trial by court martial only served to show his conduct in brighter colors. He d. at Hong-Kong.

Pottstown, Montgomery co., Pa., on Schuylkill River, 40 mi. n.w. of Philadelphia. Railroads: Pennsylvania; and Philadelphia & Reading. Industries: iron and steel manufacture, rolling mills, furnaces, steel mills, nail works, etc., also foundries and machine shops, and agricultural implement works. Pop. 1900, 13,696.

Pottsville, Schuylkill co., Pa., on Schuylkill River, 93 mi. n. of Philadelphia. Railroads: P. & R.; Lehigh Valley; P. & S. V.; P. & E.; and People's Ry. Industries: iron and steel co., coal and iron works, silk mill, three knitting mills, cigar and shirt factories. Surrounding country mining. The town was first settled about 1820. Pop. 1900, 15,710.

Poughkeepsie, Dutchess co., N. Y., on Hudson River, 74 mi. n. of New York. Railroads: N. Y. C. & H. R.; West Shore; Poughkeepsie & Eastern; P. R. & N. E. Industries are various, including manufacture of boots and shoes, iron and cotton goods, farming implements, carriages, carpets, dye stuffs, etc. It is a center of education, the principal institution being Vassar College. Near here is the Hudson River State Hospital for the Insane. Pop. 1900, 24,029.

Poultry, a general name for all birds bred for the table, or kept for their eggs. The birds most commonly included under this designation are the common fowl, the pea fowl, the guinea fowl, the turkey, goose, and duck. There is this great difference between the varieties of the domestic fowl, that some are disposed by constitution to continue laying throughout the whole season without sitting; while others after having laid from twelve to fifteen eggs sit obstinately, and cease to lay. Among the breeds most in favor are those known as Dorking, Game, Hamburg, Cochin, Brahma, Scots Gray, Polish, Spanish, etc. Poultry, if they are to be kept for profit, should have a spacious house, with a yard and shed attached. The house should be moderately warm, well lighted, and perfectly dry. Either boxes must be formed along the walls to serve as nests for the fowls, or shelves on which baskets for the nests may be put. These boxes and shelves may be formed of wood; but they are better when constructed of smoothly polished flagstones or slates. Turkeys and geese would better not occupy at night the same house with hens and ducks, as they are apt to be mischievous, especially to sitting birds. A small pond is sufficient for the thrifty rearing of both geese and ducks.

Pound, weight of two different denominations, *avoirdupois* and *troy*. The pound *troy* contains 5,760 grains, and is divided into 12 ounces; the pound *avoirdupois* contains 7,000 grains, and is divided into 16 ounces. The *pound*, or *pound sterling*, the highest monetary denomination used in British money accounts, and equal to 20 shillings, was so called from originally being equal to a quantity of silver weighing one pound. The pound is strictly a money of account, the coin representing it being the sovereign.

Poussin, Nicolas (1594–1665), a distinguished French historical and landscape painter, b. at Andelys in Normandy. In 1630 he married, and about this time his affairs, which had hitherto possessed a precarious aspect, began to improve. He found liberal patrons in Cardinal Barberini and in the Cavaliere Cassiano del Pozzo, for whom he painted the celebrated *Seven Sacraments*, now at Belvoir Castle. He was also invited to paint the great gallery of the Louvre; and his successes gained him the position of first painter to Louis XIII, with a pension of 3,000 livres. From 1640 to 1642 he resided in Paris; but the rivalry of French painters and the want of appreciation of his works evinced by the Parisians induced him to return to Rome, where he lived until his death.

Powderly, Terence V., b. in Pennsylvania in 1849. He began life as a switchman, and early in life was identified with various labor organizations. He was elected mayor of Scranton, Pa., in 1877 and again in 1878. The following year he was elected general master workman of the Knights of Labor. He has contributed largely to the *Arena* and to the *North American Review*. He was appointed commissioner general of immigration in 1897 by President Mc Kinley.

Powell, John Wesley, geologist, was b. in Mount Morris, N. Y., in 1834. In the Civil War he rose to be lieutenant colonel, losing an

arm at Shiloh. In 1867 and years following, under direction of Smithsonian Institution and Department of the Interior, he conducted the geographical and geological survey of the Rocky Mountain region. His *Contributions to North American Ethnology* are embraced in 3 vols. In 1881 he was appointed director of the U. S. Geological Survey. His publications include many scientific papers and addresses, and numerous government volumes. He has been president of the Anthropological Society of Washington and of the American Association for Advancement of Science.

Power of Attorney, in law, is a deed or written instrument whereby one person is authorized to act for another as his agent or attorney, either generally or in a special transaction.

Powers, Hiram (1805–1873), sculptor, the son of a farmer, b. at Woodstock., Vt, in 1805. He early displayed great ingenuity in mechanical matters, and became somewhat noteworthy on this account while acting as a shopman and assistant to a clockmaker of Cincinnati. He next obtained employment in a museum in that city. At this period he formed the acquaintance of a German sculptor, and having been taught modeling by him, determined to become himself a sculptor. In 1835 he went to Washington, and had sufficient success there to enable him to proceed to Italy. He now settled in Florence, where he resided until his death. He is distinguished in portraiture, and produced busts of many of the most noted American statesmen. His most famous ideal works are the statue of *Eve*, the *Greek Slave*, and the *Fisher Boy*.

Powers, The Great, a term of modern diplomacy, by which are now meant Britain, France, Austria, Germany, Italy, and Russia.

Prætor, an important official in the ancient Roman state. Up to 367 B.C. the title was merely an adjunct to that of consul; but when at that date the consulship was thrown open to the plebeians, the judicial functions of the consul were separated from his other duties and given to a new patrician magistrate, who was entitled the prætor. In 337, after a struggle, the plebeians were also admitted to this office. In 246 B.C. another magistracy, that of *prætor peregrīnus*, was instituted for the purpose of settling disputes between foreigners and between foreigners and citizens; and in distinction from him who filled this office the other functionary was termed *prætor urbānus*. After election the two prætors determined their offices by lot. The *prætor urbanus* was the first in position, and was the chief magistrate for the administration of justice. To the edicts of the successive prætors the Roman law is said to owe in a great measure its development and improvement. About B.C. 227 the number of prætors was increased to four; afterward to six and eight; and under the empire the number varied from twelve to eighteen. After completing his year of office the prætor was often sent as *proprætor* to govern a province.

Prague (prāg), the capital of Bohemia, a prosperous and well-built city near the center of the kingdom, on both sides of the Moldau, here crossed by seven bridges; 153 mi. n.w. of Vienna and 75 mi. s.e. of Dresden, with both of which it is connected by railway. Its site is a regular basin, cut in two by the river, from the banks of which the houses rise on both sides till they are terminated and enclosed by hills of considerable height. Among the public buildings of Prague are the old castle, or palace of the Bohemian kings; the Roman Catholic cathedral; the Jesuit college, called the Clementinum; the Carolinum, or college of law and medicine; the townhall; the Teynkirche, or old church of the Hussites; the palace of Wallenstein, etc. The manufactures of Prague are of great variety, including gold and silver embroidery, silk, woolen, cotton, and linen goods, porcelain, and jewelry. The suburbs of Karolinenthal and Smichow, with populations of 20,000 each, are quite modern, and are busy industrial centers. Prague is one of the oldest towns in the kingdom, dating from the eighth century. Its university was founded in 1348, and had at one time about 10,000 students. Recently it was divided into two universities, a German and a Czech, or Bohemian, having together more than 3,500 students. The city was long greatly disturbed by the struggles between the Roman Catholics and the Hussites. It suffered severely also in the Thirty Years' War. In 1631 the city was captured by the Saxons, who were driven out a few months later by Wallenstein. Since that date it has passed through many vicissitudes. In 1742 it was taken by the French and Bavarians, and two years later capitulated to Frederick the Great. After the Seven Years' War the city made rapid strides. During the Austro-Prussian war in 1866 Prague was occupied by the Prussians, and here the treaty of peace was signed August 23. Pop. 162,323.

Prairie, the name given to the vast natural meadows or plains of the Mississippi Valley, especially lying between it and the Rocky Mountains, and extending northward into Central Canada. Throughout this immense territory the differences of level are sufficient to produce a steady flow of the rivers, but not so great as to obstruct their navigation, thus securing a unique system of easy intercommunication between all sections of the country. There is a great sameness in the features of the topography, the vegetable productions, the soil, the geological features. Some of the prairies that have a peculiarly undulating surface are known as *rolling prairies*. Vast herds of buffaloes used to roam over the prairies, but these have now disappeared. Immense tracts are now cultivated, and produce large crops of wheat and maize with little outlay of labor on the part of the farmer.

Prairie Dog (or Prairie Marmot), a small rodent animal, allied to the marmot as well as to the squirrel, and found on the prairies west of the Mississippi and east of the Rocky Mountains. These animals live gregariously in burrows, and are characterized by a sharp bark, like that of a small dog, whence their popular name. They are about 1 ft. in length exclu-

sive of the tail, which is rather short. Their burrows are quite close together, and have a mound of excavated earth near the entrance, on which the little animals are wont to sit and look around them. These communities are termed "villages." A second species, *C. columbiānus*, inhabit the region west of the

Prairie Dog.

Rockies. The prairie dog is not to be confounded with the prairie squirrel, to which it is allied.

Prairie Hen, the popular name of the pinnated grouse of the U. S. The neck of the male is furnished with neck tufts of eighteen feathers, and is remarkable also for two loose pendulous wrinkled skins which somewhat resemble an orange on inflation. The prairie hen is much prized for the table.

Prairie Squirrel (or Gopher), a name for several animals found in the prairies in great numbers. They live in burrows, and not on trees, and much resemble the prairie dog or marmot. They have cheek pouches, in which their food is carried. This consists of prairie plants with their roots and seeds.

Prairie Wolf (or Coyote), the small wolf which is found on the prairies, believed by many to be a mere variety of the European wolf. It is a cowardly animal, and only dangerous to man when in packs and pressed by hunger.

Pratt Institute, a co-educational institution for manual and industrial training established in Brooklyn, N. Y., in 1887, by Chas. Pratt. The institute comprises a high school, providing for a general education, and normal, technical and trade departments. The institute conducts both day and evening classes. The department of domestic art is especially famous for its excellent courses in sewing and cooking. In 1904 the instructors numbered 124, the students 3,485, and the library contained 77,126 volumes. The president is Chas. M. Pratt.

Praxit'eles (-lēz), one of the greatest sculptors of ancient Greece, a citizen, if not a native of Athens, flourished about 364 B.C. He and his contemporary Scopas stand at the head of the later Attic school, so called in contradistinction to the earlier Attic school of Phidias. Without attempting to rival Phidias in grandeur, Praxiteles chose subjects which demanded a display of the human form, especially in the female figure. The finest is said to have been the Cnidian Aphroditē (Venus), whom he was the first to represent naked. The group of Niobe and her children, now in existence at Florence, is by some attributed to Praxiteles, and by others to Scopas. His two statues of Eros (Cupid) were also celebrated; one of them, placed in the temple of Eros, at Thespia, and the statue of a satyr, were regarded by Praxiteles, according to Pausanias, as his finest works. An excellent copy of the latter still exists. Among his works were statues of Apollo, Dionysos, Demeter, etc., in marble and in bronze, which served as models to succeeding artists. Quite recently, a marble statue of Hermēs by Praxiteles has been discovered at Olympia.

Precession of the Equinoxes, a slow motion of the line of intersection of the celestial equator or equinoctial and the ecliptic, which causes the positions occupied by the sun at the equinox to move backward or westward at the mean rate of 50.25″ per year. This motion of the equinox along the ecliptic carries it, with reference to the diurnal motion, continually in advance upon the stars; the place of the equinox among the stars, with reference to the diurnal motion, thus precedes at every subsequent moment that which it previously held, hence the name. This sweeping round in the heavens of the equinoctial line indicates a motion of the axis of rotation of the earth, such that it describes circles round the poles of the ecliptic in 25,791 years. Nutation is a similar, but much smaller gyratory motion of the earth's axis, whose period is about nineteen years. From these two causes in combination the axis follows a sinuous path, instead of a circle, about the pole of the ecliptic. Nutation causes the equinoctial points to be alternately in advance of and behind their mean place due to precession by 6.87″. At present the vernal equinoctial point is in the zodiacal sign Pisces, and it is moving toward the sign Aquarius.

Precipitate, in chemistry, a solid body produced by the mutual action of two or more liquids mixed together, one or other of them holding some substance in solution. The term is generally applied when the solid appears in a flocculent or pulverulent form. Substances that settle or sink to the buttom like earthy matters in water are called sediments, the operating cause being mechanical, not chemical. Red oxide or peroxide of mercury is often called *red precipitate.*

Préfet (prā-fā), the title of an important political functionary in France, whose office was created in 1800 at the instance of Napoleon. There is a préfet at the head of each department, who is intrusted with the whole organization and management of the police establishments; but not with the punishment of police offenses. Within this sphere of action the préfets are unchecked; the sous-préfets, who are appointed by them, and who stand at the head of the districts, are entirely subject to their commands; and the authorities of the

communes, as well as the justices of the peace, can set no limits to their activity. In time of tumult they can call out the military, or provisionally declare a state of siege. The council of the préfecture is a court in which are settled all disputes respecting the taxation of individuals, engagements with the state for building, the indemnification of those who have had to give up anything to the public, etc. Of this court the préfet is president, and in it he has a casting vote. The appeals against its decisions lie to the council of state.

Prentiss, SERGEANT S. (1808–1850), orator, b. in Portland, Me., removed to Mississippi in 1827. As a lawyer in the front rank; as a speaker remarkable for wit, sarcasm, and argumentative power, his manner of speaking was at once natural and dramatic.

Pres'byter, an office bearer in the early Christian church, the exact character and position of whom is differently regarded by different authorities. Presbyterians generally maintain that originally *bishop* and *presbyter* were one and the same; Episcopalians generally maintain that from the first they were different, as was certainly the case in very early times. By the end of the second century the presbyters held a position in connection with the congregations intermediate between that of bishop and deacon, and represented the priests or second order of clergy.

Pres'bytery, a judicatory, consisting of the pastors of all the churches of any particular Presbyterian denomination within a given district, along with their ruling (i.e., presiding) elders, there being one ruling elder from each church session commissioned to represent the congregation in conjunction with the minister. The functions of the presbytery are, to grant licenses to preach the gospel, and to judge of the qualifications of such as apply for them; to ordain ministers to vacant charges; to judge in cases of reference for advice, and in complaints and appeals which come from the church sessions within the bounds of the presbytery; and generally to superintend whatever relates to the spiritual interests of the several congregations under its charge, both in respect of doctrine and discipline. Appeals may be taken from the presbytery to the provincial synod, and thence to the general assembly.

Prescott, WILLIAM HICKLING (1796–1859), historian, b. in Salem, Mass. His father was a lawyer, the son of Col. William Prescott, who commanded the American forces at the battle of Bunker Hill. In 1811 he entered Harvard College, and graduated in 1814. While at college he met with an accident to his left eye, completely depriving him of its use forever afterward, and rendering the other eventually so weak that during the latter half of his life he could scarcely use it. After two years spent in traveling through England, France, and Italy, chiefly for health, he returned to America, where he married, and set himself assiduously to literary labor. The earliest fruits of this were contributions to the *North American Review;* and for many years his only productions were essays and magazine articles. Acquaintance with Spanish literature, which he began to cultivate in 1824, led him to attempt his first great work on Spanish history, the *Reign of Ferdinand and Isabella,* published 1837. It was received with enthusiasm both in America and Europe; was rapidly translated into French, Spanish, and German; and its author was elected a member of the Royal Academy at Madrid. Prescott's next work was the *History of the Conquest of Mexico,* with a *Preliminary View of the Ancient Mexican Civilization,* and the *Life of the Conqueror Hernando Cortez,* which appeared in 1843, and was received with an equal degree of favor. In 1847 he published the *History of the Conquest of Peru,* with a *Preliminary View of the Civilization of the Incas.* In 1855 the first two volumes of the long expected *History of the Reign of Philip II, King of Spain,* appeared, and proved to the public equally acceptable with Prescott's former works. In 1858 was published a third volume; but the sudden death of the author from apoplexy put a stop to his labors. Prescott affords a remarkable instance of the success of indomitable industry and perseverance, carried out in spite of the affliction of partial and latterly almost total blindness.

Prescription, in law, is a right or title acquired by use and time; the object being to secure the title to property to him who has had the possession of it for the term fixed by the law, and to prevent any one from disturbing his possession after such term has expired. In American practise prescription presupposes a lost grant, and can therefore give a title to those things only which can pass by grant. In almost all the states there are express statute provisions regulating the doctrine of prescription. Generally an uninterrupted possession of twenty years is required for the acquisition of real rights. In some states a notification by the owner of the land to the occupant that his intention is to contest the title may defeat prescriptive acquisition.

Presentment, in law, is properly speaking the notice taken by a grand jury of any offense, from their own knowledge or observation, without any bill of indictment being laid before them at the suit of government.

Preserved Provisions (Preserves).—The preservation of dead organized matter from the natural process of decay is a most useful means of increasing and diffusing the food supply of the world. Animals, vegetables, and fruits may all be easily preserved for this purpose. The preserving of fruits is an old and familiar process. This is generally effected by boiling or stewing, though drying is also frequently resorted to, where the fruit is meant to be kept intact. Fruits intended for confectionery are preserved in four different ways: 1, In the form of jam, in which the fruit is boiled with from one half to about equal its weight of sugar. 2, In the form of jelly, in which the juice only is preserved, by being carefully strained from the solid portions of the fruit, and boiled with a third to a half of its weight of sugar. 3, By candying, which consists in taking the fruits whole or in pieces, and boil-

ing them in a clear syrup of sugar previously prepared. They absorb the syrup which is then crystallized by the action of a gentle heat. 4, By stewing them in a weak syrup of sugar and water till they become soft but not broken, and transferring them with the syrup to jars, adding pale brandy equal in quantity to the syrup. Several kinds of vegetables, as cabbages, cucumbers, cauliflowers, onions, are preserved by pickling. See *Pickles*. Antiseptics are used to preserve meat also, salting being the most common process. But to preserve large quantities of vegetable and animal products for food purposes, and at the same time to keep them nearly in their fresh state, they must be subjected to one of three processes. These are, drying, refrigeration, and exclusion of air. With vegetables, which contain so large an amount of water in proportion to their solid and nutritious material, the process of drying is peculiarly applicable, and it is largely employed as the means of furnishing fresh vegetable food for ships in a compact and portable form, when, in addition to desiccation, compression is also employed.

The preservation of articles of food by the application of cold is the simplest of all known methods, and in such climates as North America, Russia, etc., it is largely taken advantage of. In 1875 ice began to be used to preserve fresh meat in considerable quantities, which was sent from America to Europe. In 1879 the invention of the Bell-Coleman refrigerator increased immensely the facilities for such a traffic. This invention has been succeeded by others, chief among them being the Haslam refrigerator; and the result is that the distribution of meat over the surface of the globe is being revolutionized. The modern methods of refrigeration for carrying purposes consist of an air-tight room on board ship, where the meat is kept, and through which dry cold air is made to circulate by means of special machinery driven by steam, the air being first compressed and cooled, and a further cooling taking place when it is again allowed to expand.

The process of preservation by exclusion from the action of atmospheric air is yearly assuming more importance and being more largely practised. The most perfect method, and that which is now most generally resorted to, is the enclosure of the food in air-tight cases, from which the air is then expelled; upon the perfection of the air-excluding process depends entirely the preservation of the article. The first successful attempt to preserve fresh meat in this way was made in 1809 by M. Appert, a Frenchman. The plan now generally adopted is commonly known as *canning*, and is applicable alike for flesh meats, vegetables, and fruits. The process is usually as follows: The provisions of whatever kind are packed into a tin cylinder, and the interstices filled in with water or other appropriate fluid, as gravy in the case of flesh food. The lid, which is perforated with a small aperture or pin-hole, is soldered carefully down. The cases are then set in a bath of solution of chloride of calcium; heat is applied until the whole boils, and the air is thus expelled through the pin-holes. These holes are then hermetically closed, and the canister and its contents are once more subjected to the operation of heat until the provisions are perfectly cooked. When it has become cool the canister is coated over with paint and removed to the proving room, an apartment the temperature of which has been raised to the degree of temperature most favorable to decomposition. If the operation has been successfully performed, the ends or sides of the canisters will have fallen in to some extent from the outward pressure of the air. If, after the interval of some days, the ends bulge out, it is a certain sign that the process has not been successful, the liberated gases causing the outward pressure. Such cases should be rejected or submitted again to the process. Not only may boiled provisions be preserved in this way, but roast meats also. An improvement on this process has been effected by introducing into the canisters a small quantity of sulphite of soda, which causes the absorption of any traces of free oxygen which may lurk in the cases.

President, the supreme executive officer of the U. S. The qualifications of a person raised to this dignity are to be a natural-born citizen of the age of 35 years, and to have resided 14 years within the U. S. The election is by electoral colleges in every state. In his legislative capacity the president has the power of approving bills sent to him after passing Congress, or of returning them to the house in which they originated. In his executive capacity he is commander in chief of the army and navy; his powers are prescribed in the Constitution. He holds his office for four years and is eligible for re-election. See *U. S.*

Press, Liberty of The, the liberty of every citizen to print whatever he chooses, which at the same time does not prevent his being amenable to justice for the abuse of this liberty. The right of printing rests on the same abstract grounds as the right of speech, and it might seem strange to a man unacquainted with history that printing should be subjected to a previous censorship, as it is in some states, and has been in all, any more than speaking, and that the liberty of the press should be expressly provided for in the constitutions of most free states. But when we look to history we find the origin of this, as of many other legislative anomalies, in periods when politics, religion, and individual rights were confusedly intermingled. It is only since men's views of the just limits of government have become clearer that the liberty of the press has been recognized as a right. The constitutions of many of the states declare, as we should expect, for liberty of the press. The same may be said of all the South American republics. Among European countries, it may be generally said the liberty of the press is found most predominant among the weaker powers, such as Spain, Turkey, Sweden and Norway, Switzerland, and Roumania; in France the press may be said to be comparatively free; while in

Germany, Austria, and particularly in Russia there are still many restrictions. In England the press is practically free.

Pressburg (or Presburg), a town in Hungary, 35 mi. e. of Vienna, beautifully situated on the left bank of the Danube, and on spurs of the Little Carpathians. The most striking edifice is the ruined royal palace. The cathedral is a large Gothic structure, which has latterly been considerably modernized; here the kings of Hungary were crowned. The Franciscan church is also noteworthy. There are also several palaces, including that of the primate of Hungary. The river is here crossed by a bridge of boats. The manufactures are various. The trade, particularly transit, and chiefly in corn and timber, is extensive. Pressburg is a place of very great antiquity, and was long a fortress of some strength. In 1541, when the Turks captured Buda, it became the capital of Hungary, and retained the honor till the Emperor Joseph II restored it to Buda. The treaty by which Austria ceded Venice to France and the Tyrol to Bavaria was signed here in 1805. Pop. 48,284, fully more than half of whom are Germans, and 7,000 Jews.

Preston, a municipal and parliamentary borough of England, in Lancashire, 27 mi, n.e. of Liverpool, agreeably situated on a height above the right or north bank of the Ribble, near the head of its estuary. Preston has some fine buildings. The original staple manufacture of the town was linen, which is still woven to some extent, but has been completely eclipsed by the cotton manufacture, of which Preston is now one of the chief centers. Preston also has machine shops, iron and brass foundries, railway carriage works, breweries, malt houses, roperies, tanneries, etc. Some shipping trade is carried on, and extensive harbor and river diversion works are in course of construction. Pop. 107,573.

Preston, Harriet W., b. in Massachusetts in 1843. Her first literary work was translations of *Sainte Beuve*, *Musset*, and *Mistral*. Her books are *Love in the Nineteenth Century*, *Troubadours and Trouveres*, and *A Year in Eden*.

Presumption, in law, is the assuming of a fact or proposition as true, and is of two kinds, *præsumptio juris* and *præsumptio juris et de jure*. The *præsumptio juris* is a presumption established in law till the contrary be proved, e. g., the possessor of goods is presumed to be the owner. The *præsumptio juris et de jure* is that where law or custom establishes any proposition that cannot be overcome by contrary evidence, as the incapacity in a minor with guardians to act without their consent.

Pri'am, in Greek legend, the last king of Troy, the son of Laomedon. By his second wife, Hecuba, he had, according to Homer, nineteen children, the most famous being Hector, Paris, Cassandra, and Troilus. His name has been rendered famous by the tragical fate of himself and his family, as a result of the Trojan War. When he was extremely old the Greeks demanded of him the restoration of Helen, who had been carried away by Paris, and on his refusal to give her up they made war against Troy, and took and destroyed the city, after a siege of ten years. Homer gives no account of the death of Priam; but other poets represent him to have been slain at the altar of Zeus by Pyrrhus the Greek.

Pria'pus, a Greek deity, the deformed son of Dionysus and Aphrodite, a god of gardens, fruits, etc., considered by mythologists to represent fertility in nature. He was worshiped in all parts of Greece, and also in Rome.

Prib'ylov (or Pribyloff) **Islands,** a group of islands on the coast of Alaska, in Bering Sea. The largest are St. Paul, St. George, Walrus, and Beaver Islands. They are frequented by numbers of fur-seals. The natives are Aleutians.

Prickly Ash, a name given to several prickly shrubs found in this country. They have an aromatic and pungent bark, which from being used as a remedy for toothache gains them the name of *toothache tree*.

Prickly Pear, a fleshy and succulent plant, destitute of leaves, covered with clusters of spines, and consisting of flattened joints inserted upon each other. The fruit is purplish in color, covered with fine prickles and edible. The flower is large and yellow. It is a native of the tropical parts of America, whence it has been introduced into Europe, Mauritius, Arabia, Syria, and China. It is easily propagated, and in some countries is used as a hedgeplant. It attains a height of 7 or 8 ft.

Priest, in its most general signification, a man whose function is to inculcate and expound religious dogmas, to perform religious rites, and to act as a mediator between worshippers and whatever being they worship. In some countries the priesthood has formed a special order or caste, the office being hereditary; in other countries it has been elective. In sacred history the patriarchal order furnishes an example of the family priesthood. Abraham, Isaac, and Jacob perform priestly acts, and "draw near to the Lord," as also does Job, and the Arab sheikh to this hour unites in his person the civil and religious headship. The Mosaic priesthood was the inheritance of the sons of Aaron, of the tribe of Levi. The order of the priests stood between the high priest on the one hand and the Levites on the other. In some churches, the name priest is not used, minister, pastor, etc., being the term employed instead. Those Christians, however, who, like the Roman Catholics, Greeks, etc., look upon the eucharist as a sacrifice, regard the priest as performing sacrificial duties, and as standing in a special relation between God and his fellow men. The priests of the Church of Rome are bound to a life of celibacy; but in the Greek Church a married man may be consecrated a priest. In the Anglican and other Episcopal churches the priests form the second order of clergy, bishops ranking first. Diverse views of the priestly office are held in the Anglican and allied churches.

Priestley, Joseph (1733–1804), an English philosopher and divine, was b. near Leeds. At the age of nineteen he was placed at the Dis-

senting Academy at Daventry, where he spent 3 years. In 1761 he became a teacher in the Dissenting Academy at Warrington, and while here wrote a *History of Electricity*, which gained him admission to the Royal Society, and the degree of LL.D. from the University of Edinburgh. In 1767 he became minister of the Mill Hill chapel at Leeds. While here he published his *History and Present State of Discoveries Relating to Vision, Light, and Colors*, his next important work being *Institutes of Natural and Revealed Religion.* In 1774 he discovered oxygen or "dephlogisticated air," as he called it, a result which he quickly followed by other important discoveries in chemistry. Among his works belonging to this period are *Experiments and Observations on Different Kinds of Air; An Examination of Dr. Reid's Inquiry into the Human Mind; Hartley's Theory of the Human Mind; The Doctrine of Philosophical Necessity;* etc. He next removed to Birmingham, where he became once more minister of a Dissenting congregation, and wrote *History of the Corruptions of Christianity; History of Early Opinions Concerning Jesus Christ; General History of the Christian Church;* etc. Owing to his favorable opinions regarding the French Revolution a mob assembled and set fire to his house, and in the conflagration his apparatus and manuscripts were destroyed. For this insane outrage he received compensation. On quitting Birmingham he became president of the Dissenting college at Hackney, but was goaded by party enmity to seek an asylum in the U. S. in 1794. He took up his residence at Northumberland, in Pennsylvania, where he died. As a man of science he stands high, while as a theologian, and especially as a historical theologian, he ranks low.

Prim, Juan, Marquis de los Castillejos, Count de Reuss (1814–1870), field marshal and grandee of Spain, was b. at Reuss, in Catalonia. On the outbreak of the civil war, 1813, he joined the volunteers who had taken up arms in the cause of the infant queen Isabella, and rose so rapidly that in 1837 he was appointed a colonel in the regular army. On the downfall of the Espartero ministry Prim was appointed by the queen a brigadier general, and afterward created Count de Reuss and governor of Madrid (1843). On the occasion of a democratic rising at Barcelona he was sent to restore order, but with little success. The revolt soon began to attain wide proportions, and Prim was accused of dilatoriness and dismissed from his command. In November, 1844, he was brought to trial for his share in a conspiracy for the assassination of Narvaez, president of the council, and convicted and sentenced to six years' seclusion in a fortress, a sentence which was revoked by the queen in 1845. After some years of service under the Turks he returned to Spain, and was in 1857 promoted to the rank of lieutenant general, and in 1858 raised to the senate. In the following year, war having broken out between Spain and Morocco, Prim was appointed to the command of the reserve, and his successes in this war gained him the title of Marquis de los Castillejos. In 1861 he was appointed to command the Spanish contingent. He assisted greatly the movement which ended in the downfall of Queen Isabella, after which he was appointed minister of war, and exerted himself to find a suitable candidate for the Spanish crown. This was at last found in the person of Amadeo, Duke of Aosta, second son of the King of Italy. Marshal Prim was shot by assassins.

Pri'mary, in geology, a term applied by the early geologists to rocks of a more or less crystalline structure, supposed to owe their present state to igneous agency. They were divided into two groups; *stratified*, consisting of gneiss, mica schist, argillaceous schist, hornblende schist, and all slaty and crystalline strata generally; and *unstratified*, these being chiefly granite. By geologists of the present day the term primary is used as equivalent to *palæozoic*, the name given to the oldest known group of stratified rocks, extending from the Pre-cambrian to the Permian formation.

Primogeniture, in England, the right of the eldest son and those who derive through him to succeed to the property of the ancestor. The firstborn in the patriarchal ages had among the Jews a superiority over his brethren, but the "insolent prerogative of primogeniture," as Gibbon denominates it, was especially an institution developed under feudalism. Before the Norman conquest the descent of lands in England was to all the sons alike, but latterly the right of succession by primogeniture came to prevail everywhere, except in Kent, where the ancient gavelkind tenure still remained. The right of primogeniture is entirely abolished in France and Belgium, but it prevails in some degree in most other countries of Europe. The rule operates only in cases of intestacy, and is as follows: When a person dies intestate, leaving real estate, his eldest son is entitled by law to the whole. If the eldest son is dead, but has left an eldest son, the latter succeeds to the whole of the property. If the whole male line is exhausted, then the daughters succeed—not in the same way, however, but jointly, except in the case of the crown, to which the eldest succeeds. In the U. S. no distinction of age or sex is made in the descent of estate to lineal descendants.

Evening Primrose.

Primrose, a genus of beautiful low Alpine plants, natural order Primulaceæ. Some are among the earliest flowers in spring, as the common primrose, the oxlip, and cowslip; and

several Japanese and other varieties are cultivated in gardens as ornamental plants. Their roots are perennial; the leaves almost always radical and the flowers supported on a naked stem, and usually disposed in a sort of umbel.

Common Primrose.

The different varieties of the common primrose which have arisen from cultivation are very numerous.

Prince, literally one who holds the first place. In modern times the title of prince (or princess) is given to all sovereigns generally, as well as to their sons and daughters and their nearest relations. In Germany there is a class of sovereigns, ranking next below the dukes, who bear the title of prince as a specific designation; members of royal families are, however, denominated *Prinzen*. On the continent there are many ancient families not immediately connected with any reigning house who bear the title of prince.

Prince Edward Island, an island forming a province of the Dominion of Canada, in the Gulf of St. Lawrence, and separated by Northumberland Strait from New Brunswick on the east and Nova Scotia on the south; greatest length, from east to west, about 130 mi.; breadth, varying from 4 to 34 mi.; area about 2,134 sq. mi. or 1,365,760 acres, of which over 1,000,000 are under cultivation. The coast line presents a remarkable succession of large bays and projecting headlands. The surface undulates gently, nowhere rising so high as to become mountainous, or sinking so low as to form a monotonous flat. The island is naturally divided into three peninsulas, and the whole is eminently agricultural and pastoral, the forests now being of comparatively limited extent. The soil consists generally of a light, reddish loam, sometimes approaching to a strong clay, but more frequently of a light and sandy texture. The prevailing rock is a reddish sandstone, but a large part of the surface is evidently alluvial. The climate is mild; winter, though longer and colder than in England, is free from damp unwholesome chills; and summer, without being oppressively hot, is fitted to promote the growth of all the ordinary cereals. Sheep, cattle, and horses are reared in numbers; cod, mackerel, herring, oysters, and lobsters form the most productive part of the fisheries. The manufactures are chiefly confined to linen and flannels for domestic use; there are also several tanneries, and shipbuilding is carried on to a considerable extent. The exports consist of timber, agricultural produce, and live stock, the imports of dry goods, hardware, cordage, iron, etc. A railway runs from one end of the island to the other. The capital is Charlottetown. The public affairs of the island are administered by a lieutenant governor nominated by the crown, who appoints an executive council of nine members. There is also a legislative council of thirteen and a house of assembly of thirty members, both chosen by the people. There is an excellent educational system, the elementary schools being free. The island is supposed to have been discovered by Cabot. It was first colonized by France, captured by Britain in 1745, restored, and recaptured, and finally in 1873 was admitted to the Dominion of Canada. Pop. 1901, 103,258.

Prince of Wales, a British title, first conferred by Edward I on his son (afterward Edward II) at the time of his conquest of the Principality of Wales. Edward III was never Prince of Wales, but the title has been conferred on all the male heirs apparent to the English (and afterward the British) throne from Edward the Black Prince, son of Edward III. The heir apparent is made Prince of Wales and Earl of Chester by special creation and investiture, or by proclamation, but as the king's eldest son he is by inheritance Duke of Cornwall. As heir to the crown of Scotland the Prince of Wales bears the titles of Prince and High-steward of Scotland, Duke of Rothesay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles, in virtue of an act of the Scottish parliament of 1469. The title of Earl of Dublin was also borne by Albert Edward when he was Prince of Wales.

Princeton, Bureau co., Ill. Railroad, C. B. & Q. Industries: carriage factory, flouring mill, and other small factories. Surrounding country agricultural. The town was first settled in 1834 and became a city in 1884. Pop. 1900, 6,041.

Princeton, Mercer co., N. J., 49 mi. s.w. of New York. Railroad, The Pennsylvania. It is a college town, being the seat of Princeton University, founded 1746, and Princeton Theological Seminary (Presbyterian). Pop. 1900, 3,899.

Princeton University (formerly the College of New Jersey), founded by the Presbyterian Synod of New York in 1746, and located at Princeton, N. J., in 1756. The first sessions were held in Elizabethtown. In 1848, the college was moved to Newark, where it remained until its permanent location at Princeton. Some of the most widely known of its early presidents were Jonathan Edwards, Aaron Burr and John Witherspoon. From its foundation the college ranked as one of the strongest educational institutions of the country, and by the middle of the 19th century it had risen to a position of great influence among colleges, and in the Presbyterian church. During the

presidency of James McCosh (1868–1888) its endowment was increased over $3,000,000, and great strides were made in the development of the institution, both materially and intellectually. On the 150th anniversary of its founding the College of New Jersey became Princeton University.

As now organized, Princeton University has scientific and academic courses of study requiring four years for completion, and graduate courses which constitute the university work in the various departments. The institution now (1904) has 32 buildings on its campus, 55 laboratories, a library of 176,302 volumes, besides special libraries connected with the laboratories, two astronomical observatories and museums of geology, archæology, biology and history. The faculty numbers 108, and the enrollment is over 1,500. The president is Woodrow Wilson, LL.D., who succeeded Francis L. Patton in 1902. The university is non-sectarian.

Printing is the art of impressing characters upon paper, cloth, or other material. There has been much controversy over the origin of this comparatively modern invention which has made so great a change in civilization. We will endeavor to give only the principal facts leading up to the use of movable types together with the method of their use. It is said that in the year 175 the text of the Chinese classics was cut upon tablets, which were erected outside the university, and that impressions were taken of them. Some of these are still in existence. This is the first record of characters being reproduced. In China printing from wooden blocks can be traced as far back as the sixth century when the founder of the Suy dynasty had the remains of the classics engraved on wood. Printed books became common in the tenth century. The same methods have been used down to this time. A piece of pear tree wood is cut into pieces the size of two pages. One piece is squared, planed smooth, and varnished. The design is written on a thin, transparent paper and transferred to the block by rubbing. The engraver next cuts away all but the transferred letters which are left in relief. The block is then adjusted on a table in front of the printer, who has a bowl of blue ink on one side and a pile of paper on the other. In his right hand he holds a long stick with a flat brush on each end; with one brush he spreads on the ink, then lays the paper on with his left hand, passes the dry brush over it and the sheet is removed. It is said that Chinese printed from movable types of clay in the middle of the eleventh century. For a Chinese missionary office of to-day about 6,000 movable type characters are used, but for magazine work 10,000 are necessary.

In Japan block printing dates from 764–770, when the Empress Shyan-toka had a million toy pagodas each containing a rolled-up slip of paper 18 in. in length and 2 in. in width, printed with an extract from the Buddhist scriptures, and distributed among the temples and monasteries. There is a book in the British Museum printed in Korea from movable types in 1337. Koreans claim the invention of movable copper types in the beginning of the fifteenth century, and the books of that period show that such types were used. There is reason to suppose that William the Conqueror (1027–1087) and other kings of his time had their monograms cut on blocks of wood or metal in order to impress them on their charters. This is proved by the uniformity of impressions. The idea of multiplying impressions, however, was unknown to the ancients.

The progress of block printing is described under wood engraving, and we now come to the use of movable types. Up to 1499 it was universally believed that typography was invented at Strasburg by Gutenberg, who afterward set up an office at Mainz. Here Gutenberg issued a magnificent Latin Bible called the "Mazarin Bible" because it was discovered in Mazarin's library at Paris. Gutenberg's name does not appear on a single production of his press, and none of his associates mention his name as the inventor of printing. In an article published at Cologne in 1499 the writer says it all took place at Mainz about 1440, but crude specimens of the Donatuses exist which were printed some years before at Haarlem in Holland. These crude specimens, compared with the early work done at Mainz, which is highly finished, bear out the theory that printing was first done in Holland. On Nov. 6, 1455, a notarial instrument shows that Gutenberg had spent 1,600 guilders of his partner Faust's money, and Faust took possession of the office, and with Peter Schoeffer (afterward his son-in-law) continued the work. Gutenberg then formed a partnership with another capitalist and continued the work. With two rival offices in existence it was impossible to keep the process secret, and the art spread rapidly.

In 1476 or 1477 William Caxton introduced printing into England, setting up his office within the precincts of Westminster Abbey, but not within the building. In 1530 a censorship was established at the instance of the church, Cardinal Wolsey declaimed "against the act of printing, as that which would take down the honor and profit of the priesthood, by making the people as wise as they." The printers were oppressed, lost all social standing, and people who had English translations of the Bible, were burned at the stake or branded. In 1637 regulations were issued allowing but twenty masters of printing (who could print no books until the manuscript was submitted and licensed); four founders of letters, a vacancy to be filled by the seven commissioners (principally bishops); two apprentices to each master founder, and one other person to break off the knots of metal hanging to the end of the letters when first cast. Censorship was abandoned in 1694, and a period of revival began.

The first printing press in America was set up in 1536, by Antonio de Mendoza, viceroy of

Mexico, and in 1638 the first press in our country was established at Harvard College, the second at Philadelphia in 1685, and the third in New York in 1693.

The process of printing is as follows: The pages of type to be printed are locked up with iron or wedge-shaped boxwood blocks called quoins in a steel frame called a "chase." Books are usually printed in sheets of sixteen pages or multiples of sixteen, and when locked in the chase ready for printing it is called a form. The surface of the type is covered with ink by composition rollers which are made from a mixture of molasses, glue, glycerine, etc., boiled together and cast in brass molds. Balls made of skins were used up to 1813, when two Englishmen, Donkin and Bacon, made the first composition rollers, which facilitated the work of printing very much. Rollers of to-day are made practically of the same ingredients, although many pressmen add various balsams to give suction or prevent drying out. Rollers should never be washed until wanted for use, as the ink upon them prevents them from drying out. Several firms do a large business in manufacturing rollers, and have elaborate machinery by which the composition is forced into the molds from the bottom, preventing bubbles and air holes.

The first printing press was made by Conrad Saspach, a turner, in 1436 under the direction of Gutenberg. John Dunius declared before the magistrates of Strasburg, in 1439, that he had received one hundred florins for work done at a press three years before. Gutenberg afterward remarked that the contemplation of a wine press gave him the first conception of a printing press. The essential feature of the first press was a movable flat board, platen, as now called. The form was laid upon a movable bed, inked with balls, the paper placed upon it and pushed under the platen which was brought down upon it by a powerful screw, squeezing the paper upon the form. In 1683, Moxon, the first technical writer on printing, speaks of a newly invented press, meaning the old wooden press improved by Blaen of Amsterdam. From this time until Earl Stanhope enlarged and improved the hand press about 1800, improvements were slow. The press of Clymer, of our country, called the Columbian and later the Washington, in which the impression screw was replaced by steel jaws which were brought together by pulling a lever, marks the principal advancement of the hand press. In 1772 a rotary press was patented in England by Adkin & Walker, for the purpose of "stamping and printing on paper, cotton, and other cloths, whereby the printing on such material would be greatly facilitated and rendered much less expensive and more perfect and exact." In 1790, William Nicholson, of London, editor of a scientific journal, took out a patent for a press, which foreshadowed nearly every fundamental principle in the improved presses of to-day, even to the use of curved plates fastened upon a cylinder, and the use of small form rollers feeding from a large one. Nicholson never constructed a press, however, and his patent was merely a forecast of modern methods. The evolution of the printing press from the calico printing machine is often overlooked. In April, 1811, after many delays, 3,000 copies of Sheet H of the *New Annual Register for 1810, Principal Occurrences*, were printed from a "machine" (press) invented by Konig, and is the first part of a book so printed. The sheets G and Z of Clarkson's *Life of William Penn*, were worked off on a cylinder press, which, with the aid of two men, worked off 800 sheets within an hour.

The first newspaper printed by steam was *The Times*, of London, Nov. 28, 1814, published by John Walters. The inventor was Frederick Konig, a German printer, who reached London in 1806 and patented a platen press which was a failure. In 1811 he patented a cylinder press in which the bed moved to and fro. Mr. Walters was so struck with the possibilities of this method that he engaged Konig to build a double cylinder press which should print two copies of the paper on one side only. The machine was completed and the issue of the paper mentioned informed its readers that "they held in their hands one of the first newspapers printed by steam." The speed was 1,800 sheets an hour, printed on one side.

In 1818 Edward Cowper invented several improvements, including a flat ink distributing table, ink fountain, distributing and form rollers, and was employed to perfect Konig's press. In the same year Konig patented a perfecting press (by which both sides of the sheet was printed at the rate of 750 papers per hour). Cowper also improved on this. The principle of these presses was used for years with improved methods for carrying the sheets. Robert M. Hoe, the American inventor, made marked and practical improvements increasing the capacity of presses. Mr. Hoe, in 1847, made a rotary press which would print about 20,000 papers an hour on one side. Then the invention of William A. Bullock of Philadelphia, which printed complete from a roll or web, followed. This was improved on by Walters of London, but the Hoe presses soon distanced all, and to-day papers are printed, parted, folded, and counted at the delivery boxes at a speed of 48,000 per hour.

There are a number of other very fast and desirable presses on somewhat similar lines, including the Bullock, Scott, Potter, etc.

Priscil'lian, the founder of a sect in Spain, known as Priscillianists, in the middle of the fourth century, their doctrines being a mixture of Gnosticism and Manichæism. Priscillian was himself a wealthy and accomplished man, of very temperate and strenuous habits. His followers did not leave the Catholic Church, and he was actually at one time made a bishop himself. He was ultimately executed at Treves in 385, after a prolonged struggle with the orthodox clergy. The most distinctive part of his creed was the belief in an evil spirit as the supreme power.

Prism, in geometry, a solid figure which might be generated by the motion of a line kept parallel to itself, one extremity of it being carried round a rectilinear figure. A "right prism" is one in which the faces are at right angles to the ends. In optics a prism is a transparent body having two plane faces not parallel to one another, and most commonly it is made of glass, and triangular in section, the section forming either a right-angled, equilateral, or isosceles triangle. The two latter varieties are most familiar.

Prison, a house in which a person is confined and thereby deprived of his personal liberty; especially a building for the confinement or safe custody of criminals, debtors, or others. Imprisonment is now one of the recognized methods of judicially punishing certain crimes; but formerly it was employed in nearly every country in Europe for purposes of injustice and oppression. Men were hidden in dark dungeons, where in a short time they perished, through the inefficiency of the law to protect those who were offensive to the powerful; and even in Great Britain, where the laws have always condemned the incarceration of the innocent, the prison was, by the connivance of the authorities, made subservient to gross injustice and cruelty. To the eighteenth century belongs the honor of initiating the proper regulation of imprisonment.

In the early part of the nineteenth century the most advanced examples of prison discipline and construction were to be found in the U. S., and although in the second half of the century this prominent position has not been maintained, the importance of the improvements initiated in America cannot be forgotten. Following closely on Howard's report, the Philadelphia Society for Assisting Distressed Prisoners was founded in 1776—the first of the kind in the world; and, though dissolved during the war, was reorganized in 1787, and is still at work. Large measures of reform were quickly secured; by 1790 the principle of separation was recognized, and in 1794 all convicts were separated and secluded; in the latter year, also, capital punishment was abolished in Pennsylvania for all crimes but murder in the first degree. It thus became necessary to devise some substitute for capital punishment. At the Eastern Penitentiary at Philadelphia, opened in 1829, the so-called "Pennsylvania System" of permanent seclusion of convicts was carried out; the evil effects arising from the rigorous application of this principle have been already referred to in this article, and even at Philadelphia the system is not now strictly enforced, while in all other American prisons what is known as the "Auburn System"—silent labor in association by day, and separation by night—has been adopted. In the Southern states prisoners are leased out to the highest bidders for the term of their sentences; but this system, which condemns the convicts to a slavery that is not modified even by considerations arising from personal ownership, is gradually being abandoned. The first place of detention for juvenile delinquents was opened at New York in 1825; the first reformatories on the cottage or family system were established in Ohio—for boys at Lancaster in 1858, for girls at Delaware in 1878. In 1877 the Elmira (N. Y.) Reformatory was opened, at which a now famous system has been adopted for the treatment of first offenders under thirty years of age; the principal features are indeterminate sentences, the classification of prisoners into three classes under the mark system, and discharge upon probationary parole, under supervision. The prisoners enjoy a luxurious dietary, and many indulgences are granted to induce them to work, so that the penal element of a sentence of imprisonment is entirely absent.

A grave defect alleged by American critics is that in the county jails and other places of detention for those waiting trial all such prisoners are compelled to associate in a common hall, with all the evils which follow as a necessary result. It is said also that politics to a large extent determine the selection of prison officials, many of whom are appointed simply for services rendered to their party; and that the interference of labor organizations has had a considerable effect in the direction of putting a stop to contract labor—in New York, to labor of any kind—in the prisons. It may be added that crime has increased in the U. S. in a ratio far in advance of the growth of population; in 1850 the prisoners represented 1 in 3,442 of the population; in 1880 they were 1 in 855.

Prisoners of War are persons captured from the enemy in time of war. In ancient times prisoners of war became the slaves of their captors, and even yet it is a recognized principle among nations that all the inhabitants of a vanquished town, state, or nation become the absolute property of the victors, though it is hardly necessary to say that the principle is now no longer acted upon by civilized nations. Prisoners of war are now generally either kept until the war is over, released on parole, or exchanged for prisoners taken by the other side.

Prisrend' (prisrendi), a town of European Turkey, in Albania, 80 mi. e. of Scutari. It is the residence of a pasha, and the seat of a Greek metropolitan and a Catholic bishop, and is one of the richest towns in Turkey, manufacturing large quantities of weapons, pottery, glass, etc. Pop. 39,000.

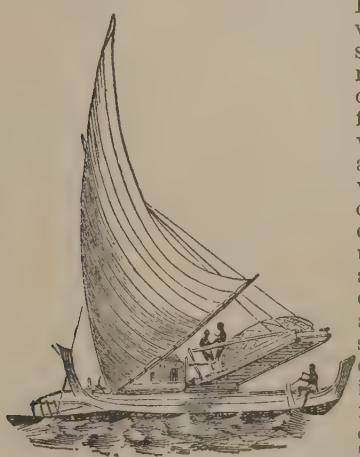
Privateer, a vessel of war owned and equipped by private individuals to seize or plunder the ships of an enemy. Such a vessel must be licensed by government and under a letter of marque, otherwise she is a pirate. In 1818 Congress passed a law forbidding enlistments on foreign privateers. By the Declaration of Paris, 1856, the great powers of Europe mutually agreed to abandon the right to arm privateers in case of war; but several nations, the chief ones being the U. S. and Spain, have not agreed to this, and it is doubtful whether it will be always strictly acted upon even by the parties to the declaration. The practise of privateering, while useful to maritime coun-

tries, and necessary at one period to England, is very harassing to trade, and gives endless opportunities for private plunder.

Privy Council, the council of state of the British sovereign, convened to concert matters for the public service, and for the honor and safety of the realm. As it exists at present, the number of members of the privy council is indefinite; they are nominated by the sovereign at pleasure, and no patent or grant is necessary, but they must be natural born subjects. The list of privy councilors now embraces, besides the members of the royal family and the members of the cabinet, the archbishops and the bishop of London, the great officers of state, the lord chancellor and chief judges, the speaker of the House of Commons, the commander in chief; and other persons who fill or have filled responsible offices under the crown, as well as some who may not have filled any important office. Officially at the head is the lord president of the council, who is appointed by patent, and who manages the debates and reports results to the sovereign. A member of the privy council has the title of "right honorable." Privy councilors are by their oath bound to advise the crown without partiality, affection, or dread; to keep its counsel secret, to avoid corruption, and to assist in the execution of what is resolved upon.

Privy Seal, a seal appended by the British sovereign to such grants or documents as are afterward to pass the great seal. Since the time of Henry VIII the privy seal has been the warrant of the legality of grants from the crown, and the authority for the lord chancellor to affix the great seal; such grants are termed letters patent. The officer who has the custody of the privy seal is called lord privy seal, and is the fifth great officer of state, having also generally a seat in the cabinet.

Proa, a peculiar kind of sailing boat used in the Malay or Eastern Archipelago and the Pacific. It is variously constructed, but regularly has one side quite flat, on a line with the stem and stern, while the other side is curved in the usual way; and being equally sharp at stem and stern, it sails equally well in either direction without turning. Their shape and small breadth of beam would render them peculiarly liable to overset were it not for the outrigger they carry, adjusted sometimes to one side and sometimes to both sides. The outrigger in the example here shown is a large structure supported by and formed of stout timbers. The outrigger may have weights placed on it and adjusted according to circumstances. Proas carry a lugsail generally of matting.



Proa.

Probate, the proof before an officer authorized by law that an instrument offered to be proved or recorded is the last will and testament of the deceased person whose testamentary act it is alleged to be. In a trial at common law, or in equity, the probate of a will is not admissible as evidence, but the original will must be produced and proved the same as any other disputed instrument. This rule has been modified by statutes in some of the states. The proof of the will is a judicial proceeding, and the probate a judicial act. The party propounding the instrument is termed the proponent, and the party disputing, the contestant. In the U. S., generally speaking, proofs cannot be taken until citation or notice has been issued by the judges to all the parties interested to attend. On the return of the citation, the witnesses are examined, and the trial proceeds before the court. If the judge, when both parties have been heard, decides in favor of the will, he admits it to *probate;* if against the will, he rejects it, and pronounces the sentence of *intestacy.* The functions of this branch are confined to deciding on the authenticity of wills and upon the proper persons to act as administrators when no will exists. The practise of the court is thrown open to the whole legal profession.

Probus, Marcus Aurelius (232–282), one of the ablest of the Roman emperors, was b. at Sirmium. At an early age Marcus attracted the notice of the Emperor Valerian, by whom, after having distinguished himself by military service, he was placed at the head of a legion; and the brilliancy of his subsequent conduct in the African, Persian, Arabian, and Germanic campaigns, brought him into still more prominent notice. On the death of the Emperor Tacitus, in 276, the army hailed him as emperor, a selection immediately confirmed by the senate and people of Rome. His chief struggle during his reign was to guard the frontiers of the empire against the barbarians, a task which he carried out with great success both in Europe, Asia, and Africa. He also settled large numbers of barbarians in the frontier provinces, and admitted them to his legions, and devoted himself to the making of roads and draining of marshes. His skillful administration and public virtues did not, however, protect him from enmity; and after a short reign he was murdered in a military insurrection.

Procedure, Civil, is the method of proceeding in a civil suit throughout its various stages. In the U. S. when redress is sought for a civil injury, the injured party brings an *action* against the party whom he alleges has done the injury. The person who raises an action is termed the *plaintiff,* and he against whom the action is brought the *defendant.* It is usual before the suit is commenced for the plaintiff's

attorney to acquaint the defendant with the demand of his client, and state that unless complied with, legal proceedings will be instituted. Should this not have the desired effect, the action is begun as a rule by issuing against the defendant a *writ of summons*, commanding him to enter *an appearance* in court, failing which an appearance will be entered for him by the plaintiff. When an appearance has been entered both parties to the suit are now said to be *in court*, and judgment may be proceeded with. The next stage is the *pleadings* or the statements in legal form of the cause of action or ground of defense brought forward by the respective sides. The next stage of procedure after the pleadings is the *issue*, which may be either on matter of law, when it is called a *demurrer*, or on matter of fact, where the fact only is disputed. A demurrer is determined by the judges after hearing argument on both sides, but an issue of fact has to be investigated before a jury, and this is denominated *trial by jury*. After the judge has summed up to the jury the *verdict* follows and then the *judgment* of the court; where there is no jury, of course, judgment is pronounced by the judge after hearing counsel.

Process, in law, a term applied in its widest sense to the whole course of proceedings in a cause real or personal, civil or criminal.

Proclamation, a public notice made by a ruler or chief magistrate to the people, concerning any matter which he thinks fit to give notice about. In the U. S. the president issues proclamations as to treaties, days of thanksgiving, admission of new states, etc.

Proclus (412–485), a philosopher of the Neo-Platonic school, b. at Byzantium. He was educated at Alexandria and Athens and became familiar with all branches of philosophy and theology. As a teacher at Athens he was very successful. His system aimed at the widest comprehensiveness. He not only endeavored to unite all philosophical schemes, but made it a maxim that a philosopher should embrace also all religions by becoming infused with their spirit. In his writings he professes to return to Plato, and to bring down Neo-Platonism from the misty heights to which it was raised by Plotinus. M. Cousin placed him on a level with the most distinguished philosophers of Greece, but this estimate is generally considered extravagant. His extant works include a *Sketch of Astronomy*, in which he gave a short view of the systems of Hipparchus, Aristarchus, and Ptolemy; *The Theology of Plato, Principles of Theology*, a *Life of Homer*, etc.

Procter, Bryan Waller (1789–1874), an English poet and prose writer. His first published work was entitled *Dramatic Scenes and Other Poems*, and appeared in 1819 under the pseudonym of Barry Cornwall, which remained Procter's pseudonym in his future writing. This volume being well received, he published shortly thereafter *A Sicilian Story and Marcian Colonna*. In 1812 he produced a tragedy *Mirandola*, which was performed with great success at Covent Garden. Procter also wrote several other books of poetry and a variety of prose works; the most interesting of these latter being a *Memoir of Charles Lamb*, of whom he was an intimate personal friend. Procter's poems exhibit much delicate grace and refinement, but have never attained great popularity. He was called to the bar in 1831, and for many years held the post of a commissioner in lunacy, which, however, he resigned in 1860.

Proctor, Richard Anthony (1837–1888), English astronomer, b. at Chelsea, and educated at King's College, London, and Cambridge University. Having devoted himself specially to the study of astronomy, he published a number of valuable works on the subject, including *Saturn and its System*, *Handbook of the Stars*, *Half Hours with the Telescope*, *Half Hours with the Stars*, *Other Worlds than Ours* (a very popular work), *Light Science for Leisure Hours*, *The Transits of Venus*, *The Cycloid and Cycloid Curves*, several *Star Atlases*, *The Universe of Stars*, *The Moon*, *Old and New Astronomy*, etc., besides two treatises on whist. He latterly resided a good deal in the U. S., where he died.

Production, Cost of, a phrase used in political economy, not always in the same sense even by the same writer. The confusion generally arises from a want of clearness in distinguishing between cost and expenses of production. The cost of production in its original meaning signifies the amount of inconveniences and exertions necessary for the production of any commodity. Used as equivalent to expenses of production, it signifies the wages and profits expended on the production of the article. It is the ultimate basis of value of articles which can be indefinitely multiplied, and regulates the minimum value of articles which are limited in quantity.

Profit, the gain resulting to the owner of capital from its employment in buying and selling, in manufacturing, or in any commercial undertaking. *Net profit* is the difference in favor of a seller between the selling price of commodities and the original cost after deducting all charges. The *rate of profit* is the proportion which the amount of profit derived from an undertaking bears to the capital employed in it. *Profit and loss*, the gain or loss arising from goods bought or sold, or from any other contingency. In *book keeping* both gains and losses are titled *profit and loss*, but the distinction is made by placing the former on the creditor side, and the latter on the debtor side.

Prognath'ic (or Prognathous), in ethnology, a term applied to the skull of certain races of men in whom the jaw slants forward by reason of the oblique insertion of the teeth. It is determined by the size of the facial or cranio-facial angle.

Progne (Procnē). See *Philomela*.

Progression, in mathematics, a regular or proportional advance in increase or decrease of numbers. Continued *arithmetical progression* is when the terms increase or decrease by equal differences. Thus, 2, 4, 6, 8, 10, and 10 8, 6, 4, 2, increase and decrease by the difference 2. *Geometrical progression* is when the terms increase or decrease in a certain con-

stant ratio, as 2, 4, 8, 16, 32, 64, and 64, 32, 16, 8, 4, 2, which respectively increase and decrease by a continual multiplication or division by 2.

Prohibition Party, organized at Chicago, in 1869. Since 1884 it has forced action in nearly every state, on the question of license as applied to the liquor traffic. Full prohibition now exists in several of the states; partial in New Hampshire, and Vermont. In nineteen states prohibitory amendments to their constitutions have been submitted to vote — the aggregate vote in favor being 1,676,603; against 1,960,994.

Projectiles, THEORY OF, is that branch of mechanics which treats of the motion of bodies thrown or driven some distance by an impelling force, and whose progress is affected by gravity and the resistance of the air. The most common cases are the balls projected from cannon or other firearms. If thrown horizontally, the body will move in a curved path, because it retains unchanged (leaving out of account the resistance of the air) its horizontal velocity, while it falls faster and faster toward the ground. A body projected obliquely has initially a certain horizontal velocity and a certain vertical velocity. It retains its horizontal velocity unchanged, but its vertical velocity is altered by the force of gravity, and in both of these cases we find that the path of the projectile is a parabola. With a given velocity the greatest range of a projectile is obtained by projecting at an angle of 45° with the vertical. The actual path of the bullet is always within the parabola of the theoretical projectile, and hence the range of a gun is much less than what the parabola would give. The range depends also upon the shape and weight of the projectile, as well as upon the initial velocity.

Prome'theus, in Greek mythology, one of the Titans, brother of Atlas and of Epimetheus, and the father of Deucalion. His name means "forethought," as that of his brother Epimetheus signifies "afterthought." He gained the enmity of Zeus by bringing fire from heaven to men, and by conferring other benefits on them. To punish this offense Zeus sent down Pandora, who brought all kinds of diseases into the world. He caused Prometheus himself to be chained by Hephæstus (Vulcan) on a rock of the Caucasus (the eastern extremity of the world, according to the notions of the earlier Greeks), where his liver, which was renewed every night, was torn by a vulture or an eagle. He was ultimately delivered by Hercules, who destroyed the vulture, unlocked the chains, and permitted Prometheus to return to Olympus. That is the tradition as shaped by Æschylus, who has a noble tragedy on the subject, the *Prometheus Vinctus* (Prometheus Bound), while Shelley has also a drama, the *Prometheus Unbound*. A different version is given by Hesiod.

Promise, in law, an engagement entered into by one person to perform or not perform some particular thing. When there is a mutual promise between two parties it is termed a contract. A promise may either be verbal or written. A verbal promise is called a promise by parole, and a written promise is in technical language called a covenant. No promise is binding unless it was made for a consideration.

Proof Impression, in printing, a rough impression from types, taken for correction. A first proof is the impression taken with all the errors of workmanship. After this is corrected another impression is printed with more care to send to the author; this is termed a *clean proof*. When this is corrected by the author, and the types altered accordingly, another proof is taken and carefully read over; this is called the *press proof*. In engraving, a proof impression is one taken from an engraving to show the taste of it during the progress of the work; also, an early impression, or one of a limited number, taken before the letters to be inserted are engraved on the plate. Proof states of engravings are usually distinguished as 1, *Artists' proofs*, with no engraved title, sometimes signed in pencil by the painter or engraver, or both. *Remarque* artists' proofs have some mark, frequently a minute part left white, or a design slightly engraved on the margin. 2, *Proofs before Letters*, still without title, but with artists' and engravers' names inserted close to the bottom of the work, and the publisher's name near the lower margin of the plate. 3, *Lettered Proofs*, with title engraved lightly in such a manner as to be easily erased, or in open letters ready for shading, when the title is finally put on the plate for the ordinary impressions.

Proofs, CORRECTION OF. The corrections to be made on a "proof" of printed matter are marked on the margin; and for this purpose an established set of signs or shorthand is used. The following specimen of a proof exhibits the application of most of these signs:—

'To rule the nations with imperial swφy, to impose terms of peace, to spare the humbled, and to rcush the proud, resigning itto others to describe the courses of the heavens, and explain the rising stars; this, to use the words of the poet of the Æneid in the apostrophe of Anchises to Fabius in the Shades was regarded as the proper province of a Roman. The genius of the people was ~~even~~ ..... more adverse to the cultivtion of the physical sciences than that the European Greeks and seen we have that the latter left experimental philosophy chiefly in the hands of the Asian and African colonists. The elegant literature and metaphysical specu‖lations of Athens, her histories, dramas, epics,

1 *a*
2 *tr.*
3 #
4 |
5 *Italic.*
6 ,/
5 *S. caps.*
7 *stet.*
8 9
9 *of*
6 ;/ 2 *tr.*
10 *wf.*
6 ⊙
11 δ
2 *tr.*

and orations, had a numerous host of admirers in Italy, but a *feeling* of indifference was displayed to the practical science of Alexandria. ['This repugnance of the Roman mind at home to mathematics and physics, extending from the Atlantic to the Indian Ocean, from Northern Britain to the cataracts of the Nile, annihilated in a measure ~~all~~ pure sciences in the conquered districts where they had ~~had~~ been pursued, and prohibited attention to them in the mother country.

Long, indeed, after the age of Ptolemy, the school in connection with which he flourished, remained in existence;' &c.

12 *Roman.*
13 *New line.*
14 *and its despotism abroad,*
3 # 15 ⊂
16 *the*
17
11 δ
18 -/
19 *Run on.*
5 *Caps.*
20

1, A wrong letter. After every mark of correction a line | should be drawn, to prevent its being confounded with any other in the same line. 2, A word or letter to be transposed. Where letters are to be transposed, it is better to strike them out, and write them in their proper sequence in the margin, like a correction. 3, A *space* wanted. This mark is used when the spacing is insufficient. 4, A space or quadrat *sticking up*. 5, Alteration of type. One line is drawn under the word for *italics*, two for SMALL CAPITALS, three for CAPITALS. 6, Correction or insertion of stops. 7, A word struck out, and afterward approved of (Lat. *stet*, "let it stand"). 8, A turned letter. 9, An omission. 10, A letter of a wrong font. 11, A word or letter to be deleted. 12, Alteration of type. 13, A new paragraph. 14, Insertion of a clause. 15, A *space* to be removed or diminished. 16, A wrong word. 17, When letters or lines do not stand even. 18, Mark for a hyphen. 19, No new paragraph. 20, The manner in which the apostrophe, inverted commas, the star and other references, and superior or "cock up" letters and figures are marked.

The immediate object of a "reader" or corrector of the press is to observe and mark every error and oversight of the compositor, with a view to make the printed sheet a perfect copy of the author's manuscript. This is on the supposition that the manuscript itself is quite correct, which is seldom the case; and therefore the duty of a good reader extends to seeing that there are no inconsistencies in orthography, punctuation, abbreviations, etc., and in many cases to the verification of quotations, dates, and proper names. Where extensive alterations, omissions, or additions are likely to be made by writer or editor, it is more convenient to take the proofs on long slips, before division into pages. The making of new paragraphs, or the suppression of those

in type, should be avoided as causing trouble and expense.

The duty of securing consistency in spelling and punctuation is especially important in the case of works on which several writers are employed, such as newspapers and cyclopedias. The corrector has also to direct his attention to the numbering of the pages; to the arrangement of chapters, paragraphs, and notes; to running titles, etc. It is part of his business to observe the mechanical defects of the work, defective types, turned letters, inequalities of spacing between words, sentences, and lines, crooked lines, and to secure symmetry in verses, tables, mathematical operations, and such like. In almost all cases two proofs are taken, and in difficult works, such as those in foreign languages, tables, etc., even more. Lastly follows the revision, in which little more is done than seeing that the compositor has made all the corrections marked on the last proof. It is usual for the writer or author to reserve the correction of the second proof for himself.

The thankless and monotonous business of a corrector or reader is more difficult than the uninitiated would believe. It requires extensive and varied knowledge, accurate acquaintance with the art of typography, and, above all, a peculiar sharpness of eye, which, without losing the sense and connection of the whole, takes in at the same time each separate word and letter.

Prophets, among the Hebrews, inspired teachers sent by God to declare his purposes to his people. From the time of Samuel frequent mention is made of a body of men bearing the general name of prophets. They were members of a school in which young men of all the tribes were instructed in the law, and apparently also in sacred poetry and music. The first school of this nature appears to have been set up by Samuel at Ramah, and there is mention of others at Bethel, Jericho, Gilgal, and elsewhere. It is probable that these schools of the prophets were formed to strengthen the attachment of the Jews to their religion, and to maintain that religion pure. The prophetic order seems to have continued in existence down to the close of the Old Testament canon. Sixteen of them are the writers of books that are admitted into the Old Testament canon. These may be divided into four groups in such a manner as to give us a partial chronological arrangement. First, there are three prophets who belong to the kingdom of Israel as distinct from that of Judah — Hosea, Amos, Jonah; secondly, there are eight prophets of the kingdom of Judah—Joel, Isaiah, Jeremiah, Obadiah, Micah, Nahum, Habakkuk, Zephaniah, thirdly, two prophets of the captivity—Ezekiel and Daniel; and fourthly, three prophets of the return—Haggai, Zechariah, and Malachi. To the first group belong also Elijah and Elisha, the two great prophets, who are not the authors of any books in the canon. The chief function of the prophetic order was to maintain the Mosaic theocracy in its purity, and the patriotism which strongly characterizes all the Hebrew

prophets was closely connected with their religious zeal. The Jewish people being the chosen of God and the immediate subjects of the divine ruler, it is the constant cry of the prophets that the people should turn to righteousness in order to be delivered from the hands of their enemies. The predictive powers of the prophets have been the occasion of much controversy. The ability of the prophets to foretell the future was generally believed in by the Jews.

Prose, ordinary spoken or written language, untrammeled by poetic measure, and thus used in contradistinction to *verse* or *poetry*. The true character of prose can be clearly conceived only by considering it in relation to poetry. The two chief states of the inward man may be called the *thinking* and the *poetical* states, and depend upon the predominance of the understanding, or the imagination and feelings. If we think (in the narrower sense of the word) we combine ideas according to the laws of reason; and prose, which is the language of sober thought, is characterized by the abstractness and precision belonging to ideas that occupy the understanding. Artistic and finished prose is among the latest attainments both of nations and individuals, and it would appear that with most nations classical prose writers are fewer than classical poets.

Prosecution (Criminal).—The American law differs from that of other countries in having no office analogous to what is termed in France *ministére public* for the prosecution of offenses. At common law, therefore, and in the great majority of cases, the so-called *prosecutor* is merely the person injured by an offense, who in the first instance obtains a summons or warrant against the accused. The result of this is that many criminals are allowed to go free merely for want of a prosecutor.

Pros'ody, that part of grammar which treats of the quantity of syllables, of accent, and of the laws of versification. Though chiefly restricted to versification, it may also be extended to prose composition. In the Greek and Latin languages every syllable had its determinate length or quantity, and verses were constructed by systems of recurring feet, each foot containing a definite number of syllables, possessing a certain quantity and arrangement. The versification of modern European languages, in general, is regulated mainly by accent and number of syllables, though the weight or quantity of syllables has also to be taken into account if harmonious verse is to be produced.

Protag'oras, a Grecian philosopher, b. at Abdera, in Thrace, apparently about 480 B.C. He was the first to assume the title of Sophist, and as such he taught principally at Athens. In 411 B.C. he was accused of atheism, for beginning one of his works (*Peri Thēon*—"Concerning the Gods") with the words, "Respecting the gods, I am unable to know whether they exist or do not exist." He seems to have died soon after, perhaps in the same year. He was the author of a large number of works, all of which are lost.

Protection, applied in economics to an artificial advantage conferred by a government or legislature on articles of home productions, either by means of bounties or (more commonly) by duties imposed on the same or similar articles introduced from abroad. Such duties may be simply *protective*, that is, such as that the foreign and home articles can compete in the market on nearly equal terms; or *prohibitory*, that is, such as to exclude foreign competition altogether. See *Tariff*.

Pro'teids, a name given to substances analogous in composition to protein, that is, consisting of carbon, hydrogen, oxygen, and nitrogen, sometimes united with sulphur and phosphorus. The gluten of flour, albumin, the fibrin of the blood, syntonin, which is the chief constituent of muscle and flesh, and casein are examples of proteids. Proteids are the essential food stuffs.

Pro'tein, a hypothetical principle of food, obtained from animal or vegetable albumin, fibrin, or casein, which are all considered to be modifications of it.

Protest', a formal declaration by the holder of a bill of exchange or promissory note, or by a notary public at his request, that acceptance or payment has been refused, and that the holder intends to recover all the expenses to which he may be put in consequence thereof.

Protestants, a name given to the party who adhered to Luther during the Reformation in 1529, and protested, or made a solemn declaration of dissent from a decree of the emperor Charles V and the diet of Spires, and appealed to a general council. The protesting members were the electors John of Saxony and George of Brandenburg, Princes Ernest and Francis of Brunswick-Lüneburg, Philip, landgrave of Hesse, and Wolfgang, prince of Anhalt, together with fourteen imperial cities, the chief of which were Strasburg, Nürnberg, Ulm, and Constance. The name is now applied generally to those Christian denominations that differ from the Church of Rome, and that sprang from the Reformation.

Pro'teus, in classical mythology, a marine deity who fed the flocks (seals) of Poseidon (Neptune) in the Ægean Sea. He is represented as a soothsayer who prophesied only when compelled by force and art, and who tried every means to elude those who consulted him, and changed himself, after the manner of the sea gods, into beasts, trees, and even into fire and water.

Protococ'cus, a genus of algæ. *P. nivālis* (red snow) appears on the surface of snow, tingeing extensive tracts in the Arctic regions or among the Alps, in an incredibly short space of time, with a deep crimson. This plant, which may be regarded as one of the simplest forms of vegetation, consists of a little bag or membrane forming a cell. A large number of these are commonly found together, but each one is separate from the rest, and is to be regarded as a distinct individual.

Pro'togene, (-jēn), a species of granite composed of feldspar, quartz, mica, and talc or

chlorite, so called because it was supposed to have been the first formed granite. It occurs abundantly in the Alps of Savoy, and is found in Cornwall, where, on decomposition, it yields china clay or porcelain earth.

Protophytes, a name given to the lowest organisms in the vegetable kingdom, consisting either of a single cell, or of several cells united by a gelatinous substance, but without any essential mutual dependence, and corresponding to the Protozoa of the animal kingdom.

Pro'toplasm, a substance consisting of carbon, oxygen, nitrogen, and hydrogen, nearly identical with the white of an egg, and constituting the most elementary living matter in animal and plant structures. It is colorless, transparent, and apparently destitute of structure, and is seen in its simplest form in some of the lowest types of animal life, as in the Protozoa. When unrestricted by an imprisoning envelope it is endued with the power of extending itself in all directions in the form of mutable processes which can be withdrawn spontaneously, and it has also the power of passing or flowing in minute masses through closed membranes without these masses thereby losing their identity of form. In the form of cells, the skin of which is merely dead and hardened protoplasm, and inclosing a nucleus, or with a nucleus embedded in its substance, it is the structural unit of all organized bodies, constituting not only the basis of the ovum of both plants and animals, but of the tissues themselves in their perfect state, which are mere multiples of such cell-units variously modified. The nucleus is believed by some to be doubtful, and due to imperfection in the glass. As the protoplasm in our bodies is continually undergoing waste, a continuous renewal of the material is essential to the continuance of life. Animals, however, cannot elaborate protoplasm from mineral substances for themselves, they being able only to convert by the process of digestion dead protoplasm into living. Plants can, on the other hand, manufacture protoplasm from mineral compounds and the atmosphere, and so they are the storehouse of protoplasmic matter for the animal kingdom. Some biologists prefer the term *Bioplasm* to that of *Protoplasm,* as being more expressive of its function. *Sarcode* is also used similarly.

Proudhon (prö-dōn), Pierre Joseph (1809–1865), a French publicist, b. at Besançon. At the age of nineteen he entered a printer's office, afterward became a press reader, and in this way acquired considerable linguistic knowledge, with the result that he wrote an *Essai de Grammaire Générale.* As a reward for his studious labors, he had conferred on him by the Academy of Besançon, the *pension Suard,* which yielded him an income of 1,500 francs for three years. Political economy now became his chief study, and in 1840 appeared his famous work, bearing on the title-page the question, "What is property?" to which the first page of the treatise contains the answer, "It is theft." For this treatise, and two others that followed, he was prosecuted at Besançon, but was ultimately acquitted. In 1843 he managed a system of water transport on the Rhône and Saône; settled in Paris in 1847; started various newspapers, and became a leader in the revolution of 1848; was elected a representative for the Seine in the Constituent Assembly; attempted with no success to found a Banque du Peuple; and for his outspokenness in the press he was imprisoned for three years.

Provençal Language and Literature, strictly the language and literature of that portion of Southern France known as Provence, but in its widest application the Provençal language includes the Romance form of speech belonging to the inhabitants of a geographical area which comprises the whole south of France. This language was the earliest cultivated of the Romance languages (or those based on the Latin), and at one time was extensively used in literature. Provençal, as a new and distinct language, appears in historical records about the tenth century, and continued as a medium of living literary expression until about the end of the thirteenth century. In 1350 a few scholars of Toulouse attempted to revive its decaying glory, and for this purpose composed a treatise on grammar and poetry. About the middle of the fifteenth century the language ceased to be used both for administrative and literary purposes, and it has long been reduced almost to the condition of a *patois.* In the present century such poets as Jasmin and Minstral have endeavored to resuscitate Provençal as a literary language, and have produced poems of no small value written in the modern form of it; while a society of literary men and scholars exists for the purpose of furthering this object. Still Provençal is a language whose interest as a vehicle of literature is mainly in the past.

Proverbs, one of the canonical books of the Old Testament, usually in the main ascribed to Solomon. According to modern Biblical critics the book of Proverbs is composed of several sections written by different authors and at different times, and finally collected into a single book at some period subsequent to the return from the captivity.

Providence, Providence co., R. I., metropolis and state capital, at the head of navigation of Narragansett Bay. Railroad, New York, New Haven & Hartford. It is a port of entry, and the second largest city in New England. Seat of Brown University (Baptist), founded in 1764, the Dexter Asylum for the poor, Butler Hospital for the insane, etc. It is one of the great manufacturing centers of the country. It ranks first in the United States in the manufacture of jewelry, has extensive silver works, shoe and corset factories, steam engine works, stove, locomotive, cigar, cotton, woolen, worsted goods and hosiery factories. Pop. 1900, 175,597.

Provincetown, Barnstable co., Mass., on Provincetown Harbor, 120 mi. from Boston. Railroads: N. Y., N. H. & H., and Old Colony. Steamboat connection with Boston. Industries, manufacturing. First landing place of the

Pilgrims in the Mayflower, 1620. Birthplace of Peregrine White, first English child b. in New England. The town was first settled about 1700. Pop. 1900, 4,247.

Prune, any variety of plum which can be cured without removing the stone. Prunes are cured in three ways: by sun drying, by evaporation through fire heat, and by cooking before drying. The output of the United States in 1900 was about 100,000,000 lbs. See *Plum.*

Pruning is the severing of portions of the stem, branches, shoots, leaves, or roots of a plant for the purpose of removing excrescent or unprofitable growths, and rendering the sap more conducive to the nutrition of the valuable parts of the plant. The immediate effect of pruning is to reduce the growth of a plant in as far as it depends on the amount of foliage duly exposed to the light; but as by judicious pruning the parts left have not only a greater share of sap, but are better exposed to the light, its ultimate effect is to produce a larger and stronger plant. From the tendency of sap to flow in increased quantity into the parts immediately adjoining those where its flow has been interrupted, an almost unlimited power is given to the gardener of controlling the direction of the growth of a plant. The season for pruning varies with the nature of the tree and the purpose for which it is pruned. In general it may be said that autumn or winter is the best season for extensive pruning; in summer an excess of vigor in the plant may require a little pruning, but in spring it not only weakens the plant but is liable to induce disease. *Root pruning* is employed to check rapidity of growth and to induce development of flower buds. The best season for this operation is after the leaves have fallen in autumn, or before the sap begins to flow in spring.

Prussia (German, Preussen), Kingdom of, the leading state of the German Empire, comprising the greater part of Northern and Eastern Germany, and part of Western Germany, divided in the following provinces: East Prussia, West Prussia, Brandenburg, Pomerania, Posen, Silesia, Saxony, Sleswick-Holstein, Hanover, Westphalia, Hesse-Nassau, Rhineland, Hohenzollern. The average density of the population is 256 to the English sq. mi.; being an increase at the rate of 76 per cent. per annum during the previous five years. The Protestants number 18,244,400, or more than 64 per cent.; the Roman Catholics, 9,620,000, or nearly 34 per cent. The capital and largest town is Berlin. Other large towns are Breslau, Cologne, Magdeburg, Frankfort, Königsberg, Hanover, Düsseldorf, Danzig. The great bulk of the inhabitants are of the German race, but about 3,500,000 are non-German, including 2,-[illegible] Poles and 400,000 Jews. Pop. 1901, 34,463,377.

Agriculture, etc.—The land in Prussia is much subdivided, especially in the more populous districts, small farms of 3 or 4 acres being the most common holding. In East and West Prussia the soil is for the most part poor; the Rhine valley and the province of Saxony may be considered the most productive portions of the kingdom. Rye is the chief agricultural product, oats are largely grown in the northeast, wheat chiefly in the south and west, while the other grain crops are spelt (an inferior sort of wheat), maize, millet, and barley. Potatoes are extensively cultivated, beet-root for the production of sugar is a very important crop; flax, hemp, and rape seed cover large areas; tobacco is raised in several provinces: and in the Rhine and Moselle districts the vine is freely cultivated and some of the finest wines produced. In East Prussia horses are reared chiefly for military purposes; cattle are largely exported from the maritime provinces, and in West Prussia and Pomerania sheep are raised in large numbers. Along the Baltic and the North Sea a considerable number of the inhabitants are employed in the fishing industry. The forests cover about 23 per cent. of the total area, and are a great source of wealth, forestry being nowhere better understood than in Prussia. The best wooded provinces are Brandenburg, Silesia, and Rhenish Prussia. In some of the forests the wild boar is common, other wild animals being the wolf, lynx, wild-cat, etc.

Mining and Manufactures.—Mining is one of the chief branches of Prussian industry; the most important mineral products being coal and lignite, iron, copper, lead, silver, and zinc, while other minerals produced to a greater or less extent are cobalt, nickel, arsenic, antimony manganese, rock salt, kainit, and other potash salts, alum, and copperas. The manufacture of porcelain and the finer kinds of ware is extensive, and leather and paper making are large industries. Other manufactures of national importance are beet-root sugar, chocolate, chicory, chemical products, and tobacco.

Trade and Commerce.—Prussia carries on a large trade both by sea and with its inland neighbors. The principal exports are textile fabrics, yarn, metals, and metal wares, agricultural produce and live stock, wool, chemicals, spirits, coal, timber, leather, stoneware and glass, etc.; and the imports are chiefly in the raw materials connected with the textile and other manufactures, and tea, coffee, and sugar, and other colonial products. Besides the ordinary road and canal communication, Prussia has an extensive system of railways (15,000 miles) which in time will become wholly national property. The principal ports are Memel, Pillau, Königsberg, Danzig, Stettin, Stralsund, Kiel, and Flensberg on the Baltic; and Altona on the North Sea. In some of these ports, and particularly Stettin, shipbuilding is carried on with considerable activity. The system of money, weights, and measures is the same as that of the rest of Germany.

Government, Administration, etc.—Prussia is a monarchy, hereditary in the male line, the present constitution of which was framed by the government, with the aid of the constituent assembly, in 1850, and subsequently modified by royal decrees. The king is assisted in the executive by an irresponsible privy council and by a cabinet which is nominally responsible to a legislative assembly composed of **two**

chambers. The upper chamber (Herrenhaus) is composed of princes of the blood of the reigning and former sovereign families of full age, the heads of the mediatized principalities, the territorial nobility created by the king, life peers chosen by the king, and a few titled nobility elected by resident land owners, etc. The second chamber, or House of Deputies (Haus der Abgeordenten), since the enlargement of the kingdom, consists of 432 members, being 1 to every 66,000 of the population. The primary qualification of electors is based on taxation, and the primary electors are divided into three classes. The first division consists of those who pay the highest taxation, the second who pay the medium, and the third of those who pay the lowest amounts. The indirect electors (Urwähler) elect the direct electors (Wahlmänner), who choose the representatives. The deputies are chosen for three years. The annual revenue and expenditure usually amount each to about $350,000,000, while the total national debt (1891) is $1,109,384,127. The principal items of revenue are direct taxes, state railways, domains, and forests. For local administrative purposes the kingdom is divided into provinces, governmental departments, circles, and communes, and all recent legislation has tended to reinforce local authority and discourage centralization. At the head of each province is a president or governor and also a military commandant. Prussia is by far the most important state in the German Empire, to the Bundesrath or Federal Council of which it sends 17 members, while to the Reichstag or Diet it sends 236 deputies (more than half the total number). Although the reigning family and nearly two thirds of the total population are Protestant, absolute religious liberty is guaranteed by the constitution. The clergy, both Protestant and Roman Catholic, are paid by the state. A complete system of primary, secondary, and university education exists, all grades of schools being linked together according to a definite scheme or schemes of study. Elementary education is enforced by law, maintained by local taxes, and administered by local authority. Prussia has ten universities—Berlin, Bonn, Breslau, Göttingen, Griefswald, Halle, Keil, Königsberg, Marburg, and Münster, attended by some 15,000 students in all. All private as well as public educational establishments are placed under the superintendence of the minister of public instruction, and all public teachers are regarded as servants of the state. The Prussian army and navy form an integral part of those of Germany in general.

History.—The historical development of the Prussian Kingdom is closely associated with three important elements. The first of these is found in the growing power of the electorate of Brandenburg, which formed the nucleus of the future kingdom; the second relates to the acquirement of the province of Prussia, which gave its name to the new heterogeneous territory; and the third is associated with the rule of the Hohenzollern family, under whose skillful diplomatic and military guidance the small Brandenburg electorate has grown into what is now considerably the larger portion of the German Empire. The Prussians were a Slavonic people inhabiting the coast territory situated between the Vistula and the Niemen. Their neighbors, the Poles, endeavored to convert them to Christianity, and to this end they (1283) conquered the whole country with the aid of the Teutonic Knights of St. George. As the price of this assistance the knights claimed the conquered territory, and established themselves in castles and walled cities. Their rule, which was a despotic oligarchy, was finally overturned by the combined forces of the Prussians and the Poles, and in 1466 West Prussia was ceded to Poland and East Prussia made a fief of the Polish crown under a grand master, and latterly under a duke.

John Sigismund was succeeded in 1619 by his son George William, who was unequal to encounter the terrible crisis that now occurred in the affairs of Germany, the Thirty Years' War. During this war the electorate became the battle ground of the contending forces, and suffered severely, being at the death of the elector in 1640 occupied by the Swedish troops. Frederick William, called the Great Elector, may be regarded as the virtual founder of the Prussian monarchy. Dying in 1688 he was succeeded by his son Frederick; who in 1701 had himself crowned as king, being the first King of Prussia. Frederick I was succeeded by his son Frederick William I, who governed Prussia till 1740. His reign was on the whole peaceful, and the country grew greatly in population, industry, and wealth. He went to war with Charles XII, and acquired part of Pomerania, with Stettin, from Sweden.

Frederick II, surnamed the Great, succeeded to the crown on the death of his father, in 1740. In less than a year after his accession he proclaimed war against Maria Theresa in order to enforce his claim to the Silesian principalities, and invaded Silesia. At the persuasion of England Maria Theresa entered into negotiations with him, but failed at first to come to an understanding. Ultimately, however, by a treaty concluded at Berlin (1742) Frederick obtained the cession, with the exception of some specified districts, of both Upper and Lower Silesia, and of Glatz. Conceiving that the Austrians might seek to regain this territory, Frederick, in 1744, invaded Bohemia, and commenced what is called the Second Silesian War. He was at first compelled to retreat, but subsequently gained such successes that when peace was concluded in 1745 Austria confirmed the cession of Silesia, which was guaranteed by Great Britain. Frederick invaded Saxony, entered Dresden, and published the despatches which proved the enmity of France and Russia. England now openly entered into a defensive alliance with Frederick, and subsidized him. The allies, whose plans had been discovered, Austria, France, Russia, and Sweden, prepared for immediate hostilities. In the Seven Years' War following upon this movement, the immense

forces which his enemies were able to bring into the field reduced Frederick to the greatest straits, and gave opportunity for the development of his strategic genius. The peace of Hubertsburg (1763) put an end to the war, which had transformed Prussia into one of the chief European powers. Frederick determining again to extend his boundaries, entered into an alliance with Austria, and invaded the territories of Poland. Negotiations followed with Russia, and in 1772 the partition of Poland was arranged in a treaty between the three powers. In this way Prussia obtained most of Pomerania and a large portion of Poland. Frederick d. in 1786, and was succeeded by his nephew, Frederick William II. In 1788 he made a useless armed intervention in the affairs of Holland, and in 1791 interfered in the affairs of France on behalf of Louis XVI. In 1792, war having already been declared by the French authorities against the empire, the Prussians, under the duke of Brunswick, invaded France. They were defeated by Kellerman at Valmy, and soon afterward Frederick William withdrew from this war with France, in which he had been the most active promoter. Then followed a second and a third partition of Poland (1793, 1795), by which Prussia acquired a considerable accession of territory. By the treaty of Basel, concluded in 1795 with the French Republic, Prussia openly abandoned her connection with the other European powers. Frederick William d. in 1797, and was succeeded by Frederick William III. Continuing his father's policy in regard to France, he courted the French directorate, and at the peace of Lunéville (1801) Prussia was indemnified by 4,116 sq. mi. ceded at the expense of the empire. In 1804 Prussia recognized Napoleon as emperor of France, and in the campaign which ended in the overthrow of Austria at Austerlitz (1805) remained neutral. This attitude was at first successful, but ultimately it led to distrust among the German states, and by the formation of the Confederation of the Rhine Prussia was isolated and left to the mercy of Napoleon. At the instigation of the latter Prussia had occupied Hanover. Frederick William declared war against France without an ally. Although the Prussian army numbered 180,000 men, the French emperor was able to put a larger force in the field. On Oct. 14, 1806, the armies met at Jena and Auerstädt, where the Prussians were completely defeated, and the whole country was soon in the hands of Napoleon. At the peace of Tilsit (June, 1807), concluded between Prussia and Napoleon, all lands between the Rhine and the Elbe were ceded to Napoleon. The years which followed were chiefly remarkable for the sweeping internal reforms which the crisis necessitated, carried out under Baron Stein and Baron Hardenberg, and almost amounting to a revolution. The restriction of the army to 42,000 was evaded by replacing rapidly the drilled men by another body of undrilled men. Thus, after Napoleon's disastrous Russian campaign of 1812, Prussia was prepared to take prompt advantage of her opportunity. The king issued a general call to arms, and 150,000 men at once responded. A treaty with Russia was concluded at Kalisch, and the league thus formed was joined afterward by Austria. In the great struggle for the overthrow of Napoleon, which followed an important part, was taken by the kingdom of Prussia. At the Congress of Vienna (1815), when the map of Europe was rearranged, Prussia, though losing some possessions, was indemnified with others more extensive and valuable, and was placed in a more advantageous position than before. She now also formed one of the states in the new German Confederacy.

After the Restoration Frederick William III leaned to the despotic counsels of Austria and Russia, supported heartily the Holy Alliance, and entered upon a reactionary policy which continued until his death in 1840. He was succeeded by Frederick William IV. In 1847 he tried to anticipate the revolutionary movement spreading throughout Europe by summoning a combined meeting of provincial parliaments at Berlin, but he conferred on them no real power. In the following year the king dismissed his ministers, and granted a constitution, the details of which were elaborated by a new parliament, and which was formally proclaimed in 1850. The Poles in 1848 revolted against Prussian rule, but the movement was summarily suppressed. In 1857, the king being unable to conduct affairs by reason of mental illness, his brother William became regent, and ultimately succeeded to the throne on the death of Frederick William in 1861.

At this time, on the complaint of the Federal Diet that Denmark had not observed its treaty obligations in regard to the duchies of Schleswig and Holstein, the Prussians, under General Wrangel, entered Schleswig (1864), and Denmark was overpowered. By the Treaty of Vienna Denmark gave up Schleswig, Holstein, part of Jutland, and Lauenburg to Germany. In the following year Prussia purchased the claims of Austria over the duchy of Lauenburg, and it was agreed that Schleswig and Holstein should be administered separately by both powers. Prussia, which had determined on appropriating them, wished to buy out Austria, but the latter would not cede her claims for money. This led to war between the two powers and to the break-up of the German Confederation, some of the states of which sided with Prussia, others with Austria. On June 15, 1866, the Prussian troops took the offensive, and the brief campaign which ensued is known as the Seven Weeks' War. After the war Prussia incorporated Hanover, Hesse-Cassel, Nassau, Hesse-Homburg, Schleswig, Holstein, Lauenburg, Hesse-Darmstadt north of the Main, and the principality of Hohenzollern, which already belonged to the royal family. The king of Prussia now invited the states of North Germany to form a new confederation, which was established on the basis of proposals made by Prussia. In 1870 Prince Leopold of Hohenzollern consented to become

a candidate for the then vacant Spanish throne. This was opposed by the French emperor, who demanded not only that the candidate should withdraw, but that the king of Prussia should pledge himself not to permit any such future candidature. This being refused, war was declared by France (1870), with a most disastrous result to herself. After the German arms had proved entirely successful, the king of Prussia assumed in 1871, the title of German Emperor.

From this point the history of Prussia is, to a great extent, merged in that of the German Empire. In the hands of Prince Bismarck, acting as premier of Prussia as well as chancellor of the empire, a strong, central, autocratic government has been maintained. See *Germany*.

Prussic Acid, called also *hydrocyanic* or *cyanydric acid,* was discovered by Scheele in 1782, but first prepared in the pure state by Gay-Lussac in 1811. It is a colorless liquid which solidifies at 5° F. to feathery crystals, and boils at 80°. Its specific gravity is about 0.7. It dissolves in all proportions in water, forming a liquid which reddens litmus paper but slightly. It is found in the kernels of bitter almonds, peaches, apricots, plums, cherries, and quinces; the blossom of peaches, aloes, etc.; the leaves of the beech, cherry, laurel; and various parts of other plants. Pure prussic acid is prepared by passing a stream of dry sulphureted hydrogen over dry cyanide of mercury. This acid, which is one of the strongest poisons known, is used medicinally to remove various forms of irritation; but in all cases it must be used with extreme caution. When an overdose is administered death is instantaneous, and with a lesser dose the symptoms are convulsions or paralysis. The nature of its action is not clearly understood, but the best antidotes are found to be ammonia, chlorine water, or a subcutaneous injection of atropine.

Psalms, Book of, one of the books of the Old Testament, containing the liturgical collection of hymns used by the Jews in the temple service. Each psalm in the collection, with a few exceptions, has a particular superscription, such as *Maschil,* instruction, *Michtam,* memorial, etc. The chronology of the psalms is much disputed. The earliest is said to have been written by Moses, many are attributed to David, a few are supposed to have been written on the return from the captivity, and some are assigned to the time of the Maccabees.

Psaltery (or Psalterion), an instrument of music used by the Hebrews, the form of which is not now known. That which is now used is a flat instrument in the form of a trapezium or triangle truncated at the top, strung with thirteen chords of wire, mounted on two bridges at the sides, and struck with a plectrum or crooked stick, thus resembling the dulcimer (which see).

Psammetichus (sam-met'i-kus), a king of Egypt who d. about 617 B. C. He was one of the twelve kings who reigned simultaneously in Egypt for fifteen years after the expulsion of the Ethiopian dynasty; but being suspected by the other kings of aiming at sole sovereignty he was driven into banishment. With the aid of some Greek mercenaries, however, he defeated the other kings in a battle fought at Momemphis, on the east side of Lake Mareotis, after which he became the sole king of Egypt (671 or 670 B. C.), and the founder of a new dynasty.

Psara (or Ipsara) (*Psyra*), an island of Turkey, in the Grecian Archipelago, 7 mi. n.w. of Scio, about 5½ mi. in length, and as many in breadth.

Psyche (sī'kē), a sort of mythical or allegorical personification of the human soul, a beautiful maiden, whose charming story is given by the Latin writer Appuleius. She was so beautiful as to be taken for Venus herself. This goddess, becoming jealous of her rival charms, ordered Cupid or Love to inspire her with love for some contemptible wretch. But Cupid fell in love with her himself. Many were the trials Psyche underwent, arising partly from her own indiscretion, and partly from the hatred of Venus, with whom, however, a reconciliation was ultimately effected. Psyche by Jupiter's command became immortal, and was forever united with her beloved.

Psychology may be briefly defined as the science of mental phenomena. After having long occupied a doubtful place as a department of metaphysics, supplemented by many empirical observations, its character as a science dealing with a special order of facts, and many of the laws of occurrence of these facts, may now be said to be established. At the same time opinion is still far from unanimous on many of the most important points of psychological doctrine, especially on such points as involve a philosophical view of the nature of mind.

Mental "Faculties."—The observation and description of mental facts have led to a classification of them, according to their degrees of likeness, into certain orders; and these have been frequently spoken of as different powers or functions of the mind. In the earliest stage of psychological inquiry we even have them described as different parts of the soul. In this way Plato distinguishes desire, anger, and reason, and locates them in the lower part of the body, in the heart, and in the brain respectively. But the classification which had most influence upon subsequent writers was Aristotle's. His distinction of thought and desire is the origin of the dual classification of intellectual and active powers (each with many subdivisions) which was for long almost unanimously adopted. A tripartite classification—Cognition, Feeling, and Desire or Will—was put forward by the psychologists of Kant's time, accepted by Kant, and since his time has been very generally adopted. The value of such classifications is easily, and has often been, overestimated. In the first place, it is clear that, although such functions or faculties may be distinguished, they do not operate apart from one another. No concrete state of mind consists merely of knowl-

edge or merely of will; nor can it be properly called by one of these names, except as a means of describing it by its most prominent characteristic. In the second place, it has to be borne in mind that it is no explanation of a mental fact to refer it to a mental faculty. To maintain, as Kant, Hamilton, and Lotze did, that there are certain fundamental conscious functions or conscious elements which cannot be reduced to some single function or element, gives no real support to the view which seems to underlie much of the "faculty psychology"—the view that mind is a congeries of distinct faculties, and psychology a process of labeling facts and putting each into its proper compartment. To refer phenomena to memory, generalization, etc., as their causes is to mistake a name for an explanation.

The "faculty psychology" described and demolished by the English Associationists and by Herbart is, however, rather a mode of thought into which certain writers have frequently lapsed than a method which they have consciously adopted and defended. And the quest for a simple and uniform mental element from which all the wealth of conscious life has been derived is not therefore successful, because the faculty psychology is unsuccessful. Herbart regards the interaction of presentations as accounting for all mental phenomena; in a similar way Spencer seeks to derive mind from a succession of somethings which can only be described as analogous to nervous shocks. But the difficulty of both is to pass from this objective element to the feeling of pleasure or pain, aptly described by Hamilton as subjectively subjective, or to the phenomena of Volition. Accordingly, many psychologists who are at one with Herbart and the Associationists in rejecting the conception of faculties as a mode of explaining facts yet hold that the final analysis we can reach of consciousness or of mental phenomena does not enable us to derive subjective feeling (of pleasure or pain) from presentation, or activity from either, the three elements being involved in the simplest state of consciousness (the term "consciousness," as distinguished from "self-consciousness," being here used as a quite general term for any mental state).

Attention.—Many of the most important controversies of psychology center in the question of the nature and extent of the activity involved in consciousness. In its simplest form this activity is seen in the subjective reaction involved in apprehending a presentation; in its most developed form it is the act of will which determines a course of conduct upon which momentous issues are known to hang. In the latter case, as well as in the former, the critical point is the direction of Attention. Now attention is generally allowed not to be a special "faculty," or separate activity different from the elements of consciousness already described. It is simply consciousness regarded as active and as concentrated on some portion of its objective content, whereby the intensity of that portion is increased. The point in dispute is chiefly whether this active concentration is ultimately determined by the strength of external factors. It is clear that the direction of attention is conditioned by the previous mental groupings of ideas. Further, attention involves a muscular adjustment—at any rate when directed to objects of sense, and also (although in a less marked degree) when directed to a train of thought. These facts are differently interpreted. On the one hand, Bain, Ribot, and others, find the basis of attention in the muscular adjustment; on the other hand, the muscular adjustment is looked upon as the organic expression and development of subjective activity; and this subjective activity is held to be involved in the simplest state of consciousness. The one view looks upon the external as determining and even somehow producing the internal. According to the other view the process is one in which a subjective or spiritual factor expresses itself through and gradually extends its control over an organic and physical environment.

Sensation.—Sensations are commonly defined as the simple mental states which result from nervous stimuli. This physiological reference enables us to distinguish the Special Senses, with their clearly defined organs adapted to the reception of different kinds of external stimuli, from Organic or General Sensibility, which arises from the state of the internal organs of the body (such as the alimentary canal, the lungs, and the heart), and from the Motor Sensations. These last (which play so important a part in the development of knowledge) are due to the central excitation of a motor or efferent nerve, and the consequent contraction of the muscle in which it terminates. The sensation both modifies and is modified by the conscious state into which it enters. We have no experience, and can form no valid conception, of the mere sensation. For the subject which experiences it, it is merely an element in a complex and ever-changing whole. This is a point which has been commonly overlooked by the Associationist psychologists. They started with a succession of disconnected mental molecules, called sensations, and attempted to trace the growth of mental life from their combination. But this is to begin with an abstraction. The earliest stage of mental life would rather seem to be a vague manifold into which distinction is just being brought; and the growth of knowledge consists not only in the addition of new elements, but in drawing new lines of distinction and forming new groupings of elements. And these distinctions and groupings may be said to be determined by the varying intensities of different elements in the changing mental content, or by the continuous redistribution of attention.

Ideation.—The mental content thus varies in the distinctness of its parts, which may even disappear from consciousness and afterward reappear. This reinstatement in consciousness is called Representation or Ideation, and the represented or ideal contents are called Images. The circumstances determin-

ing the succession of ideas and formation of images are, first, new sense-impressions; secondly, voluntary direction of attention; and thirdly, the mutual influence of the mental elements. It is the last of these which is referred to under the title of Laws of Association. In the article *Association of Ideas* an account is given of the way in which one concrete experience recalls another. In every case of association a twofold process would seem to be involved. A portion of the present mental content coalesces with a resembling portion of a past mental state, and the revival of this portion involves the reinstatement in consciousness of the other elements with which it was previously connected. The latter, which is the properly reproductive process, is thus due to the fact that consciousness is not a collection of atomic sensations, but a continuous whole.

Perception is the knowledge by means of sensation of an individual object or thing. The nucleus of the percept is thus one or more present sensations which coalesce with revived or ideal elements belonging to the same sense, and combine with revived or ideal elements belonging to other senses. These presentative and representative elements are bound together and presented as a single mental content, which we refer to a portion of the body or to a thing in space beyond the body, and to which we ascribe qualities corresponding to our sensations. In brief, Perception, as distinguished from Sensation, involves, first, complexity of elements; secondly, localization; and thirdly, individualization and objectification. The complexity consists of the elements of present sensation, and of the ideal group with which the former coalesce or combine. The localization clearly involves the perception of space. The individualization and objectification may be accounted for by the following considerations: (*a*) The various sensations grouped together in a percept—e.g., the resistance, touch, color, taste, smell of an orange—are so related that modification of one of them commonly involves modification of the others. Thus they come to be perceived as a group. (*b*) Not only are motor sensations involved in fixing attention on other sensations, but the greatest distinctness of the other sensations is commonly accompanied by conditions which admit also of sensations of touch and resistance. Hence the object comes to be experienced as offering resistance or as an *obstacle.* (*c*) In this way the other sensations come to suggest touch and resistance, and thus to be referred to a thing in space which offers resistance to our muscular energy. This forms the psychological basis of the distinction between primary and secondary qualities of matter.

The above account traces the perception of objects in so far as it is mainly dependent upon active touch, i. e., touch plus its attendant motor sensations. To active sight—i. e., sight plus its attendant motor sensations—a perception is due which differs from the preceding (*a*) in the absence of the sensation of resistance; so that we do not derive from active sight alone a knowledge of objects outside of and opposed to our own bodies, and our apparently direct perception of distance, solidity, etc., by sight is really a derived perception; (*b*) in the vastly greater number of elements simultaneously presented, so that the simultaneity of perception which characterizes the developed perception of space is mainly due to visual perception.

Space and Time.—As the preceding paragraph points out, objects or things are perceived as in space. Similarly, our conscious life is apprehended as a succession, i. e., as in time. The whole of our experience may thus be said to be conditioned by Space and Time; the phenomena of external perception by space, those of internal perception by time. The two spheres are sometimes described as the object world and the subject world respectively. Regarding both space and time there are several questions which admit of being kept distinct. First of all, there is the question as to their reality—are they real existences, or simply modes of our subjective perception? This is a question which properly lies outside psychology, and belongs to metaphysics. Then there is the question of the way in which we form concepts of space and time. Geometry depends upon such a conception of space. The points, lines, and surfaces of geometry are not percepts, but abstractions from perception, formed as other concepts are formed. What then is that in perception from which we are able to form concepts of space and time? It must itself be a spatial or temporal percept. It is then with regard to the perceptions of space and time that the most difficult psychological question enters. And the question regarding both perceptions is affected by the secular controversy concerning the existence and the function of an *a priori* factor in mind.

Thus we start with two opposed views of the perception of space: first, the Intuitive or Nativist theory, according to which space is an innate idea (or, as since Kant it has more commonly been put, is the form in which we perceive objects), and is not derived from sensations, but is a form of perceiving, belonging *a priori* to the mind, and contributed by it in the production of experience; secondly, the Empirical theory, according to which space is the worked-up product of sensations. The universal and necessary character of the spatial perception has been brought forward in defense of the former theory. But it is important to remember that certain sensations—odors, tastes, and even sound—are localized only indirectly, as belonging to a visible or tangible object. Sensations both of movement and resistance accompany touch; and sensations of movement accompany sight to an extent which is not nearly equaled in the other senses. In addition to this, however, we must take account of what Lotze calls the "local signs" which belong to tactual and visual sensations. These local signs are due to the extended nature of the sense organs of sight and touch, and are

elements in sensation by which sensations arising from the stimulation of different portions of the retina (or of the skin) are distinguished from one another. The simultaneous distinctness in sensation which is due to these "local signs" is gradually interrupted by motor sensations, and out of these elements there gradually emerges the perception of one's own body, by relation to which other things are localized in space. Thus, although the perception of space is implied in that of body, the two perceptions grow to clearness together.

The perception of time seems a simpler question than the other because we are apt to confuse the succession of presentations on which it is based with a presentation of succession, which, of course, would be a presentation of time. The elements from which this presentation of time is derived may be somewhat as follows: When a number of presentations are successively presented, each grows fainter as attention passes from it, and hence arises a vague distinction between present and not present. Afterward, on the same series being repeated, the second member will be rising in intensity when the first is presented, and therefore in full intensity; when the second is presented, the first will be sinking in intensity, while attention will be passing on toward the third, whose intensity will therefore be rising; and so on throughout the series. Hence the vague distinction of present and not present becomes more definite as a distinction of past, present, and future, and this is the presentation of time.

Memory and Expectation.—Both of these are distinguished from the mere succession of ideas and images by involving a reference to one's own conscious life as a succession in time. When an image is remembered its various parts have a fixed order and position, it is accompanied by a number of attendant or accessory ideas, and it is recognized as belonging to one's past self. The expected image has not always the same fixed position or number of attendant ideas; but it, too, is referred to self, one's future self, and it is characterized by an element of striving or tension and by an increasing degree of intensity. The phenomena of memory and expectation are a recognized difficulty for the theory which seeks to derive mind from the succession of presentations.

Thought.—In the process of thinking different mental contents are related together, generalized into notions or concepts, discriminated, and, in the higher forms of thought, arranged in an orderly manner under some scientific or other ideal. Thinking is further distinguished from perception and imagination by dealing with classes of things rather than particular objects, and by being mainly voluntary, whereas perceptions are mainly automatic. But the distinction is not an absolute one. In imagination and even in perception a process of voluntary selection may be involved, and every clear perception involves a conception of a class to which the object is referred. Further, the relating process which is characteristic of thinking may be found, though in a less explicit manner, involved in perception: for the percept has been shown to consist of a variety of elements connected together in definite ways. Carrying the analysis further, we can find no conscious content without such relations. This has been commonly brought out by emphasizing the necessity of difference for consciousness.

Psychology

Relations are involved in all consciousness equally with elements related. "Feelings" and "relations between feelings" (to use Mr. Spencer's terminology) must be regarded as equally ultimate in mind. The Associationists made consciousness begin with separate units of sensation or "feeling;" and those writers who have received and carry on the tradition of the Associationists have devoted much attention to determining the nature of these relations. But if the ultimate datum of consciousness is not separate atoms of presentation, and if the growth of mind consists not merely in additions to a *continuum*, but in drawing new lines of distinction and connection within it, we may see how neither the so-called "feeling" nor the so-called "relation between feelings" is independent and conceivable by itself, and how both are simply abstractions from the state of mind which, even at its simplest, is a concrete phenomenon. In other words, what is characteristic of thought as well as what is characteristic of sensation is involved in all consciousness.

Feeling and Emotions.—The term *feeling* is of very ambiguous significance in psychology. But there is a pretty general agreement to use it for the second of the three elements in the tripartite division of mind (although, unfortunately, it has not been restricted to that use). The psychology of feeling has two problems to deal with: first, to determine the nature and conditions of pleasure and pain, as contrasted with other elements of mental life; and secondly, to analyze into their elements, and trace the growth of, the complex feelings or emotions. The emotions are complex states of mind in which a feeling of pleasure or pain is predominant. This feeling is connected, more or less distinctly, with a presented or ideal object, and is complicated with elements of organic sensation, and, usually, with tendencies to action or elements of desire. These complex states of feeling, or emotions, take their various forms, according to the elements of which they are composed, and their mode of origin. The classification of the emotions and the nature and origin of such emotions as sympathy and the moral sentiment are still vexed questions of psychology.

Desire and Volition.—In these phenomena we have the development of the active element in mind complicated with feeling and manifesting itself in muscular activity. Writers who regard this active element as ultimately due to the play of merely presented or external factors have attempted to derive volition from spontaneous movement (Bain) or from reflex action, factors which enter consciousness merely as motor presentations. As opposed to this we have the view that the fundamental

act of *Will* is the direction of attention to certain ideal elements or groups. Whether this direction of attention is itself determined solely by pleasure and pain is a question which has raised more controversy than perhaps any other question in psychology. In Desire there is present the conception of an object or ideal end, accompanied by feeling and by an element of striving. Normally, when the conception of the end has been associated with definite means to its realization, the desire is followed by a volition or act of will. The development of volition is a process of growing complexity and definiteness. Beginning with the act of attention, the power of will is gradually extended over the bodily movements controlled by muscles in connection with the motor nerves. Movements which are at first random, reflex, instinctive, or merely expressional, are brought within its operation. Further, will grows side by side with reason and imagination, is called into operation not by sense-presentation only, but in response to images and concepts, and can thus be regulated by reason. A double tendency is at work in this development: the associative and automatic tendency of acts frequently repeated to become habitual; and the intellectual tendency by which ends and the acts tending toward them are brought into rational order. In this way the individual comes to act for permanent ends and from fixed principles, and to develop a definite character.

Ptarmigan (tär'-), a bird of the grouse family (Tetraonidæ), distinguished from the true grouse by having the toes as well as the tarsi feathered. The common ptarmigan (called

Common Ptarmigan—summer and winter plumage.

also *white grouse*) is the *Lagōpus vulgāris*. The male is about 15 in. long, the female about an inch less. In summer the predominant colors of its plumage are speckled black, brown, or gray, but in winter the male becomes nearly pure white, and the female entirely so. The willow ptarmigan or willow grouse occurs in great abundance in the arctic regions of America and in Norway.

Pterodac'tyl ("winged finger"), a genus of extinct flying reptiles of the order Pterosauria, found in the Jura Limestone formation in the Lias at Lyme-Regis, in the Oolite slate of Stonefield, etc. The pterodactyls had a moderately long neck, and a large head. The jaws armed with equal and pointed teeth; most of the bones, like those of birds, were "pneumatic," that is, hollow and filled with air; but the chief character consisted in the excessive elongation of the outer digit (or little finger) of the forefoot, which served to support a flying membrane. A number of species have been discovered, most of them small or of moderate size, but one must have had an expanse of wing of at least 20 ft.

Pthah (or Phtha), an ancient Egyptian divinity, the creator of all things and source of life, and as such father and sovereign of the gods. He was worshiped chiefly at Memphis under the figure of a mummy-shaped male, and also as a pygmy god.

Ptol'emy (Ptolemaios), the name of a line of Græco-Egyptian kings, who succeeded, on the division of the empire of Alexander the Great, to the portion of his dominions of which Egypt was the head. They were also distinguished by the surname Lagidæ, from Ptolemæus Lagus, the founder of the dynasty. Ptolemy I, called *Soter*, the Savior, was by birth a Macedonian. On the death of Alexander he attached himself to the party of Perdiccas, and secured for himself the government of Egypt. In 308 he invaded Greece, and proclaimed himself as a liberator; but he made little progress, and having garrisoned Corinth and Sicyon, which he lost some years later, he returned to Egypt. He was a great patron of art, learning, and literature, and founded the celebrated Alexandrian library. Ptolemy II succeeded his father, and reigned in almost complete peace. His chief care as ruler was directed to the internal administration of his kingdom. Ptolemy III, surnamed *Euergĕtes* (the benefactor), was early engaged in an important war against Syria, which having invaded he advanced without opposition to Antioch, then turned eastward subduing Mesopotamia, Babylonia, etc. The fleets of Ptolemy had at the same time subdued the coasts of Asia Minor, and carried his arms to the Hellespont and to the coast of Thrace. Ptolemy took some part in the affairs of Greece against the rulers of Macedonia, and maintained friendly relations with Rome. Ptolemy IV, surnamed *Philopator*. His Syrian possessions having been gradually wrested from him by Antiochus the Great, Ptolemy put himself at the head of a large army and completely defeated Antiochus at Raphia, in B. C. 217. Ptolemy V (surnamed *Epiphănes*), his son and successor, was under five years old at his father's death, and this led Philip of Macedon and Antiochus III (the Great) of Syria to combine to dispossess Ptolemy, and divide his dominions. To avert this danger the guardians of the young king placed him under the protection of Rome, which thus had first an occasion for interfering in the affairs of Egypt. Ptolemy VI (surnamed *Philomētor*) was a child at the death of his father. His reign was much disturbed by the rivalry of a brother, and being expelled from Alexandria he repaired

to Rome B. C. 164, by whose intervention he was replaced. During the reigns of the succeeding Ptolemies the influence of the Romans in Egypt gradually increased, with a corresponding decrease in the independence of the native sovereigns. PTOLEMY XII reigned jointly with his sister Cleopatra till B. C. 48, when Cleopatra was expelled, and raising an army in Syria invaded Egypt. On the arrival of Cæsar, Cleopatra by her charms acquired an ascendency over him. Ptolemy put himself at the head of the insurgents, was defeated by Cæsar, and drowned in attempting to make his escape. PTOLEMY XIII, the youngest son of Ptolemy XI, was declared king by Cæsar in conjunction with his sister Cleopatra B.C. 47.

Ptolemy (CLAUDIUS PTOLEMÆUS), a Greek astronomer and geographer of the second century after Christ. He appears to have resided in Alexandria, where he made astronomical observations in 139, and he was alive in 161. Ptolemy's great astronomical work is entitled *Megalē Syntaxis tēs Astronomias*, and is more commonly known by the Arabic title *Almagest*. His system, founded on the apparent movements of the heavenly bodies, and which is still known by his name, was only superceded by that of Copernicus.

Public Health Acts, certain acts of Congress regulating sanitary matters. In this country scientific investigation into the means for preserving health is of recent growth, although laws were early enacted by the colonies for the prevention of the introduction of contagious or infectious diseases from foreign ports. State boards of health have been created in at least thirty-five states. In 1878 Congress passed "An Act to prevent the introduction of contagious or infectious diseases in the U. S.," providing that no vessel coming from a foreign port where contagious or infectious disease may exist shall enter any port of the U. S., except in a manner prescribed by regulations. In 1879 a National Board of Health was created by Congress; its duties were to obtain information upon all matters affecting public health, and to advise the several departments of the government and the executives of the several states on all questions submitted by them. Town or city boards of health have existed for many years in all the large cities, authorized by public health acts of legislatures.

Public Schools, the schools established under any national system of education. In the U. S. their administration, organization, and support depend upon the state legislatures. Boards of education in many states have special charge of the schools. Three grades are commonly recognized — the primary, grammar, and high. Normal schools for the training of teachers are established in nearly all the states.

Pub'lius Syrus, Latin writer, so called because a native of Syria, was carried as a slave to Rome about the middle of the first century B. C. His master gave him a good education, and afterward set him free. He excelled in writing *mimi*, or farces, which were interspersed with moral sentences, and a collection of them was used by the Romans as a schoolbook. A number of apothegms, not all of them composed by him, have been published as *Publii Syri Sententiæ*.

Pueb'la (in full, La Puebla de los Angeles), the capital of a Mexican state of the same name, situated on a plateau 76 mi. s.e. of Mexico. It has spacious streets and solidly built houses, the cathedral being a magnificent structure. It contains a large number of religious edifices, many of them highly decorated. There are also several colleges, a museum, and a theater. It is one of the chief seats of Mexican manufacturing industry, and its chief products are cotton and woolen goods, leather, glass, earthenware, and soap. Puebla was built by the Spaniards in 1533–34. Pop. 75,000. The state consists of an elevated plateau, and contains much fertile soil. On the western frontier is the volcano of Popocatepetl, the highest mountain in Mexico. Area 12,042 sq. mi.; pop. 839,468.

Pueblo Indians are semi-civilized Indians of the Western states, in New Mexico, and Arizona, some 8,278 in number, living in villages, in communal houses (a number of families together), and possessed of considerable skill in agriculture and the simpler kinds of manufacture. Their village communities are self-governed.

Pueblo, Pueblo co., Colo., on Arkansas River, 45 mi. s. of Colorado Springs. Railroads: Denver & Rio Grande; Denver & New Orleans; A. T. & S. F.; and C. R. I. & P. Industries: silver smelting works, one being the largest in the world, iron and steel works, mining machinery, and flour mills. It is the commercial center of Southern Colorado and is located in a rich mining district. The state agricultural society and state insane asylum are located here. Pop. 1900, 28,157.

Puerto-prin'cipe, an old town in the interior of Cuba, early in the century the seat of the central government and supreme courts of justice of the Spanish West Indies. Its chief manufacture is cigars. It is connected by railway with its port, San Fernando de Nuevitas. Pop. 46,641.

Pu'fendorf (or Puf'fendorf), SAMUEL, BARON VON (1632–1694), German writer on the law of nature and nations. In 1661 he became professor of the law of nature and of nations at Heidelburg. In 1677 he published his work *De Statu Reipublicæ Germanicæ*, which, from the boldness of its attacks on the constitution of the German Empire, caused a profound sensation. In 1670 he went to Sweden, became professor of natural law in the University of Lund, and brought out his chief work, *De Jure Naturæ et Gentium*, and in 1675 an abstract of it, *De Officio Hominis et Civis*. In 1677 Pufendorf went to Stockholm as historiographer-royal. There he wrote in Latin his vigorous vindication of Protestantism, *On the Spiritual Monarchy of the Pope*, a *History of Sweden from the Campaign of Gustavus Adolphus in Germany to the Abdication of Queen Christina*, a *History of Charles Gustavus*, and in German his *Intro-*

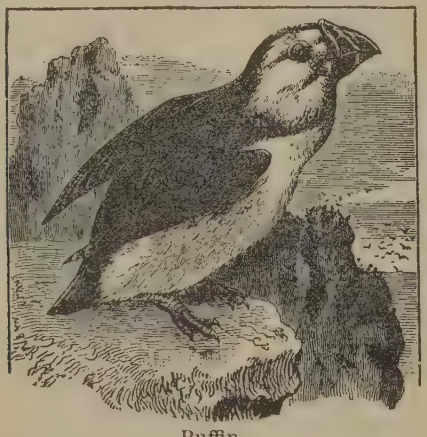
duction to the History of the Principal States of Europe. In 1686 he received a summons to Berlin from Frederick William, elector of Brandenburg, a history of whom Pufendorf wrote for his son, the first king of Prussia. In 1694 he was created a baron by the king of Sweden, and in the same year he d. at Berlin.

Puff Adder (or *Vipĕra* or *Clothō arietans*), a serpent found in South and Central Africa. Its popular name is derived from its power of puffing out the upper part of the neck when

Puff Adder.

irritated or alarmed. It is very thick, attains a length of 4 or 5 ft, and is extremely venomous. The Bosjesmen poison their arrows with its venom.

Puffin, the name for the marine diving birds of the genus *Fratercŭla.* The common puffin (*F. arctica*) is a native of the arctic and northern temperate regions. It can fly with great rapidity when once upon the wing. It is about a foot in length, and from the singular shape and enormous size of its bill, which is striped with orange upon bluish gray, is often called



Puffin.

the sea parrot or the coulter-neb. Their plumage is glossy black, with the exception of the cheeks and under surfaces, which are white. It breeds upon rocks and in the rabbit warrens near the sea, and lays one egg, which is white. It lives on fish, crustacea, and insects, and is a gregarious and migratory bird.

Pug Dog, a small dog which bears a miniature resemblance to a bull dog, and is only kept as a pet.

Puget Sound (pū′jet), an inlet on the northwest coast of state of Washington, forming the southwest continuation of Juan de Fuca Strait, with which it is connected by Admiralty Inlet. On its shores are Seattle, Olympia, and other towns.

Pug Mill, a machine for mixing and tempering clay. It consists of a hollow iron cylinder, generally set upright, with a revolving shaft in the line of its axis, carrying a number of knives projecting from it at right angles, and arranged in a spiral manner. The clay is thrown in at the top of the cylinder, and by the revolution of the shaft is brought within the action of the knives, by which it is cut and kneaded in its downward progress, and finally forced out through a hole in the bottom.

Pulitzer, Joseph, b. in Hungary in 1847. Early in life he came to America and began work on the *Westliche Post,* in St. Louis, under Carl Schurz. He was elected to the Missouri Legislature in 1869, and in 1874 was a member of the State Constitutional Convention. In 1884 he was elected a member of Congress. He founded the St. Louis *Post Dispatch* in 1878, and purchased the New York *World* in 1883. In 1903 he founded a school of journalism at Columbia University.

Pulley, a small wheel movable about an axle, and having a groove cut in its circumference over which a cord passes. The axle is supported by a kind of case or box called the *block,* which may either be movable or fixed to a firm support. The pulley is one of the six simple machines or mechanical powers, and is used for raising weights. A single pulley serves merely to change the direction of motion, but several of them may be combined in various ways, by which a mechanical advantage or purchase is gained, greater or less, according to their number and the mode of combination. The advantage gained by any combination or system of pulleys is readily computed by comparing the velocity of the weight raised with that of the moving power, according to the principle of virtual velocities. The friction, however, in the pulley is great, particularly when many of them are combined together. A pulley is said to be fixed when the block in which it turns is fixed, and it is said to be movable when the block is movable. In the single fixed pulley there is no mechanical advantage, the power and weight being equal. It may be considered as a lever of the first kind with equal arms. In the single movable pulley where the cords are parallel there is a mechanical advantage, there being an equilibrium when the power is to the weight as 1 to 2. It may be considered as a lever of the second kind, in which the distance of the power from the fulcrum is double that of the weight from the fulcrum. In a system of pulleys in which the same string passes round any number of pulleys, and the parts of it between the pulleys are parallel, there is an equilibrium when the power is to the weight

as one to the number of strings at the lower block. In a system in which each pulley hangs by a separate cord and the strings are parallel, there is an equilibrium when the power is to the weight as 1 to that power of 2 whose index is the number of movable pulleys. Whatever be the mechanical arrangement of the pulleys and of the ropes the principle of all pulleys is the same, namely, the transmission of the tension of a rope without sensible diminution so as to obviate the loss of force consequent on rigidity. The term pulley is used indifferently to denote either a single sheave or the complete block and its sheaves. In machinery a pulley is a wheel, generally with a nearly flat face, which being placed upon a shaft transmits power to or from the different parts of the machinery, or changes the direction of motion by means of a belt or band which runs over it.

Pullman, GEORGE M., inventor, b. in Chautauqua co., N. Y., 1831. At twenty-two he contracted for removing warehouses on the Erie canal; afterward in Chicago raising entire blocks of brick and stone buildings. In 1859 made his first sleeping car, now developed into the car known all over the world—especially adapted for sleeping in, or as a drawing room or dining car. The industrial town of Pullman was founded by him, to improve the social surroundings of his workmen. D. 1897.

Pulque (pụl'kā) (or Octli), a favorite drink in Mexico and Central America, made from the juice of various species of agave, pleasant and harmless until after protracted fermentation, when it becomes an intoxicant. A kind of brandy is also distilled from it.

Pulsom'eter, an instrument of the pump kind for raising water, especially when that liquid is mixed with solid matter. It acts by the condensation of waste steam sent into a reservoir, the water rushing up into the vacuum formed by the condensation.

Pum'ice, a substance frequently ejected from volcanoes, of various colors, gray, white, reddish brown, or black; hard, rough, and porous; specifically lighter than water, and resembling the slag produced in an iron furnace. Pumice is really a loose, spongy, froth-like lava. It contains 75 parts silica and 17 alumina, with some iron, lime, soda, etc., and the pores being generally in parallel rows, it seems to have a fibrous structure. Pumice is of three kinds, glassy, common, and porphyritic. It is used for polishing ivory, wood, marble, metals, glass, etc.; also for smoothing the surfaces of skins and parchment.

Pump, a contrivance for raising liquids or for removing gases from vessels. The air pump is dealt with in a separate article. Though the forms under which the hydraulic pump is constructed, and the mode in which the power is applied, may be modified in a great variety of ways, there are only four which can be considered as differing from each other in principle. These are the *sucking* or *suction pump*, the *lift pump*, the *force pump*, and the *rotary* or *centrifugal pump*. Of these the suction or common household pump is most in use, and for ordinary purposes the most convenient. A piston is fitted to work air-tight within a hollow cylinder or barrel; it is moved up and down by a handle connected with the piston rod, and is provided with a valve opening upward. At the bottom of the barrel is another valve, also opening upward, and which covers the orifice of a tube called the suction tube, fixed to the bottom of the barrel, and reaching to the bottom of the well from which the water is to be raised. When the piston is drawn up from the bottom of the barrel the air below is rarefied, and the pressure of the external air acting on the surface of the water in the well, causes the water to rise in the suction tube until the equilibrium is restored. After a few strokes the water will get into the barrel, the air below the piston having escaped through the piston-valve. By continuing, the water will get above the piston and be raised along with it to the cistern, at the top of the barrel, where it is discharged by a spout. The *lift pump* has also two valves and a piston, both opening upward; but the valve in the cylinder instead of being placed at the bottom of the cylinder is placed in the body of it, and at the height where the water is intended to be delivered. The bottom of the pump is thrust into the well a considerable way, and the piston being supposed to be at the bottom, as its valve opens upward there will be no obstruction to the water rising in the cylinder to its height in the well. When the piston is drawn up its valve will shut, and the water in the cylinder will be lifted up; the valve in the barrel will be opened, and the water will pass through it and cannot return as the valve opens upward; another stroke of the piston repeats the same process, and in this way the water is raised from the well; but the height to which it may be raised is not in this as in the suction pump limited to 32 or 33 ft. The *force pump* differs from both of these in having its piston solid, or without a valve, and also in having a side pipe with a valve opening outward, through which the water is forced to any height required, or against any pressure that may oppose it. In such pumps the *plunger* or solid piston is frequently employed instead of the ordinary piston. The plunger works air-tight through a stuffing-box at the top of the barrel, and on being raised produces a vacuum in the pump barrel into which the water rushes by the pipe, and is discharged, on the descent of the plunger through the pipe, the valves serving to intercept the return of the water at each stroke. The side pipe, however, requires the addition of an air vessel. "Double-acting" pumps are often employed for household purposes. Centrifugal pumps are universally employed wherever the lift is not too great, and the quantity of water is considerable. A wheel, shaped like an ordinary fan, has passages leading from its center to its circumference; it is made to rotate very rapidly in a casing. Its circumference communicates with a delivery pipe, and its center with a pipe leading to the water which is to be pumped. The rapid revolution

of the wheel causes by centrifugal action a constant flow of water from center to circumference of the wheel; and in this way the water is sucked up to the center of the wheel, and leaves the circumference by the eduction pipe.

Pumpkin, a climbing plant and its fruit, is originally from India, but at present is cultivated in America and most parts of Europe. The fruit is red, and sometimes acquires a diameter of 2 ft. There are two varieties of the plant, one with roundish, the other with oblong fruit. The fruit is eaten in a cooked state.

Punch, a tool worked by pressure or percussion, employed for making apertures, in cutting out shapes from sheets or plates of various materials, in impressing dies, etc. Punches are usually made of steel, and are variously shaped at one end for different uses. They are solid for stamping dies, etc., or for perforating holes in metallic plates, and hollow and sharp edged for cutting out blanks, as for buttons, steel pens, jewelry, and the like.

Punctuation, the art of employing signs by which the parts of a writing or discourse are connected or separated as the sense requires, and the elevation, depression, or suspension of the voice indicated. Punctuation serves both to render the meaning intelligible, and to aid the oral delivery. Our present system of punctuation came very gradually into use after the invention of printing, the Venetian printers, the Manutii, contributing materially to its development. The principal points used in English composition are the *comma* (,), *semicolon* (;), *colon* (:), *period* or *full stop* (.), *note of interrogation* (?), *note of exclamation* or *admiration* (!), *dash* (—), and *parenthesis* ( ).

Punjab (or Panjab) (the name means "Five Rivers"), a province of British India, under the administration of a lieutenant governor. The present lieutenant governorship of the Punjab is bounded on the w. by Afghanistan and Beluchistan; on the n. by Kashmir; on the e. by the Northwest Provinces; and on the s. by Sind and Rajputana. The area, exclusive of native states, is 110,667 sq. mi.; pop. 20,866,847; inclusive of native states, the area is 142,428 sq. mi., and the pop. 25,130,127. It consists of thirty-two British districts and thirty-four native tributary states. Lahore, situated near the center of the province, is the capital of the Punjab, but its principal city is Delhi, the ancient metropolis of the Mogul sovereigns of India. The extreme northern portion of the Punjab is rendered mountainous by spurs, or offsets of the great Himalayan system; but for the most part the province consists of a series of extensive plains. The eastern plains include the most fertile and populous portion of the Punjab, with the three great cities of Delhi, Amritsar, and Lahore. Their population is largely urban; trade and manufactures flourish, and the cultivable area is generally under the plow, with the exception of the southwestern portions, where flocks and herds pasture in extensive jungles. The western plains, on the contrary, and with the exception of a comparatively narrow zone which is fertilized by irrigation, and which produces some of the finest wheat in the world, are covered by stunted bush, with short grass in dry seasons, and by saline plants which afford nourishment to great herds of camels. These, with cattle, sheep, and goats, are tended by a nomad population. The difference between the inhabitants of these two series of plains is also very marked, those in the eastern partaking of the character of the Hindu inhabitants of India, while those in the western resemble more the Mussulman peoples of the trans-Suleiman country. One of the most important products of the Punjab is rock salt. In addition to the manufactures common to the rest of India the industries of the Punjab include such special products as the silks of Multan and the shawls and carpets of Lahore. The province enjoys an extensive trade with adjacent countries.

Purchase, Louisiana, the purchase by the United States from France, of the "Province of Louisiana." In 1800 Spain retroceded Louisiana to France. The prospect of having France as a neighbor on the west, Spain on the south and England on the north, alarmed Pres. Jefferson, who immediately suggested that the U. S. proceed to buy the Floridas and the Island of New Orleans. James Monroe was dispatched upon this mission in 1803, with $2,000,000 at his disposal. France, which was at that time at war with England, was under the direction of Napoleon. He doubted his ability to hold Louisiana against his enemy and therefore offered to sell it to the U. S. The price was finally fixed at 80,000,000 francs ($15,000,000); the deal was consummated April 30, 1803, and ratified by the U. S. Senate, Oct. 20. The area of the new territory was about 1,000,000 sq. miles; the population, about 90,000. According to the treaty the inhabitants were to become full citizens of the U. S. as soon as possible, and the following states have been admitted into the Union: Louisiana, Arkansas, Missouri, Kansas, Colorado, Nebraska, Wyoming, North and South Dakota, Iowa, Montana, Minnesota; and Indian Territory and Oklahoma Territory have been organized. In 1904 the 100th anniversary of the purchase was celebrated by a mammoth World's Fair at St. Louis. The total cost approximated $50,000,000; the grounds occupied 1200 acres.

Purdue University, a State institution of higher learning established at Lafayette, Ind., in 1869. The university is really an institute of technology and comprises schools of mechanical, civil and electrical engineering, agricultural science and pharmacy. All students are required to spend an average of three hours a day in laboratory, shop or field. In 1904, there were 96 instructors and 1,296 students. The president is W. E. Stone.

Puritans, a name first given to those clergymen of the Church of England who refused to conform to its liturgy, ceremonies, and discipline as arranged by Archbishop Parker and his coadjutors. In spite of the sharpest repressive measures, the principles of the party among the clergy who believed that the church did not separate itself

markedly enough from Roman Catholicism and needed further reformation gradually spread among the serious portion of the laity, who were also called Puritans. But the name appears not to have been confined to those who wished for certain radical changes in the forms of the church. The character that generally accompanied this wish led naturally enough to a wider use of the term; hence, according to Sylvester, "the vicious multitude of the ungodly called all Puritans that were strict and serious in a holy life were they ever so comformable." This is the sense in which the Elizabethan dramatists use the word. From this very breadth of usage one sees that there were different degrees of Puritanism. Some would have been content with a moderate reform in the rites, discipline, and liturgy of the church; others (like Cartwright of Cambridge) wished to abolish Episcopacy altogether, and to substitute Presbyterianism; while a third party, the Brownists or Independents, were out-and-out dissenters, opposed alike to Presbyterianism and Episcopacy. During the reigns of James I and Charles I the spirit of Puritanism continued more and more to leaven English society and the English Parliament, although the most violent efforts were made by both monarchs to extirpate it. Up till the time of the Synod of Dort (1618–19) both the Puritans and their opponents in the church had been substantially Calvinist; the strong tendency toward Arminianism among churchmen raised a new ground of controversy between the Puritans and the other sections of the church, both Laudian and Latitudinarian. The policy of Laud and the outrages practised by Charles on the English constitution led many who were not at all Genevan in their ideas to oppose both church and king for the sake of the national liberties. In the memorable "Westminster Assembly of Divines" (1643) the great majority of the ministers were Presbyterians. But the more advanced Puritans, who were predominant in the army and the Parliament, ultimately triumphed in the person of Cromwell. The Restoration (1660) brought back Episcopacy, and the Act of Uniformity (1662) threw the Puritans of the church into the position of dissenters. Their subsequent history is treated under the different forms of dissent. Before the civil war broke out so great were the hardships to which the Puritans were exposed that many of them emigrated to America, to seek liberty and peace on the solitary shores of the New World. Here they became the founders of the New England states, and cultivated unmolested that form of Christianity to which they were attached. Nowhere did the spirit of Puritanism in its evil as well as its good more thoroughly express itself than in Massachusetts.

Pusey, Edward Bouverie, D.D. (1800–1882), after whom the Tractarian movement in the Church of England became designated Puseyism. In 1828 he was appointed to the regius professorship of Hebrew at Oxford, to which was attached a canonry of Christ Church. In 1833 the *Tracts for the Times* began to appear, but he was not prominently connected with the Tractarian movement until 1835–36. He published a defense of the famous *Tract No. 90*, and in 1843 he was suspended by the vice chancellor of Oxford from preaching for three years, on account of the very high sacramental doctrine inculcated in his sermon on the Eucharist. During the rest of his life he lived very retired, though a continual flow of books, pamphlets, etc., came from his pen.

Putnam, Israel (1718–1790), Revolutionary soldier, b. in Salem, Mass. Many incidents are related of his youthful hardihood and courage. In the war of the Revolution he was a leading spirit: commanding at Bunker Hill, and appointed by Congress one of the four major generals under Washington.

Putnam, Windham co., Conn., on Quinebaug River, 33 mi. n.e. of Norwich. Railroad, New York & New England. Industries: cotton, woolen, and silk mills; shoes, cutlery, trunks and steam heaters are also manufactured. Pop. 1900, 6,667.

Putrefaction, such a decomposition of dead organic matter as is generally accompanied by the evolution of fetid gases; now regarded as due to the agency of bacteria or other organisms floating in the atmosphere, which find a nidus in the putrescible matter and grow and multiply in it. The substances in which these animalcules are thus developed are reduced either to much more simple compounds, or to their original separate elements. The putrefaction, or putrefactive fermentation, of animal substances is usually attended by more fetid and noxious exhalations than those arising from vegetable products, chiefly through the more abundant presence of nitrogen in the former. The formation of ammonia, or of ammoniacal compounds, is characteristic of most cases of animal putrefaction, while other combinations of hydrogen are also formed, especially carbureted hydrogen, together with complicated and often highly infectious vapors or gases, in which sulphur and phosphorus are frequently discerned. These putrefactive effluvia are for the most part easily decomposed or rendered innocuous by the agency of chlorine. The rapidity of putrefaction and the nature of its products are to a great extent influenced by temperature, moisture, and access of air. A temperature between 60° and 80°, a due degree of humidity, and free access of air, are the circumstances under which it proceeds most rapidly. Hence the action of the minute organisms which produce putrefaction can be checked or altogether prevented by a very high, or a very low, temperature, by the exclusion of air, and by the absence of moisture. Antiseptics prevent and to some extent arrest the progress of putrefaction.

Pye, Henry James (1745–1813), poet laureate, was of an old Berkshire family. In 1784 he entered Parliament as M.P. for Bucks. Having in 1775 published a translation of six odes of Pindar, in 1778 one of Frederick the Great's *Art of War*, and in 1786 another of the *Poetics of Aristotle*, with a commentary, he was, in

1790, appointed poet laureate. In 1792 he was appointed a Westminster police magistrate. In 1801 appeared his *Alfred*, an epic.

Pygma'lion, in Greek mythology, a king of Cyprus, who, having made an ivory image of a maiden, fell in love with his own work, and entreated Venus to endow it with life. His prayer was granted, and the maiden became his wife.

Pygmy, one of a race of dwarfs, first mentioned by Homer as dwelling on the shores of Ocean, and having to sustain a war against the cranes every spring. Later writers place them mainly in Africa, Aristotle at the sources of the Nile, and in fact there are dwarfish races in the interior of Africa.

Py'lades (-dēz), in Greek mythology, son of Strophius, king of Phocis, and Anaxibia, the sister of Agamemnon, after whose murder by Clytemnestra, their son Orestes, being carried secretly to the court of Strophius, formed the friendship with Pylades which has become proverbial. He assisted Orestes in murdering Clytemnestra, and eventually married his sister Electra.

Pyramid, in architecture, a colossal structure of masonry, having a rectangular base and four triangular sides terminating in a point, used by the ancients in various parts of the world for sepulchres or for religious purposes, especially in Egypt. The largest and most remarkable of the Egyptian pyramids occur in several groups on the west side of the Nile, on the border of the Libyan desert, extending for a distance of about 25 mi. from north to south, the farthest north being opposite Cairo. They are built chiefly of the hard limestone of the adjacent hills, but large blocks of granite brought from a distance are also used, especially on the outside. The four sides are so placed as to face the four cardinal points. These structures are supposed to date from about 3000 B. C. to 2300 B. C. The stones used varied in size, but are mostly large, requiring wonderful mechanical skill to quarry them, transport them, and raise and adjust them in their proper places. An almost fabulous number of laborers were engaged in erecting the chief Egyptian pyramids, of which the group of Gizeh, 4 mi. s.w. of Cairo, in the neighborhood of the ancient Memphis, is the most remarkable. This group consists of nine pyramids, among them the three most celebrated of all, the pyramid of Cheops (Khufu), called the Great Pyramid; of Cephren (Khafra); and of Mycerinus (Menkauru). According to Herodotus the Great Pyramid took 100,000 men working for ten years to make a causeway 3,000 ft. long in order to facilitate the transport of the stone from the quarries; and the same number of men for twenty years more to complete the pyramid itself. Its base forms a square, each side of which was originally 768 ft., though now, by the removal of the coating, only 750 ft. long, occupying 13 acres. The outer surface forms a series of steps, each of the average height of 3 ft. or more. When the structure was perfect this step formation was hidden by the coating, which rendered the sides quite smooth, and the apex, where there is now a space of 12 sq. yds. was no doubt originally quite sharp. The height was originally about 480 ft., but is now only 451. The interior, entered 49 ft. above the base of the north face, contains several chambers, one of which, called the King's Chamber, is 34¼ ft. long, 17 wide, and 19 high, and contains a sarcophagus of red granite. The second pyramid is 690 ft. square and 447 ft. high. The third pyramid is only 354 ft. square and 203 ft. high, and is the best constructed of the three. The six smaller pyramids which complete the Gizeh group are of much inferior interest. The pyramids are supposed to have been built by the respective kings as tombs and memorials of themselves; and it is conjectured that they were begun at the beginning of each reign, and that their size corresponded with the length of it. About 350 yards s.w. of the Great Pyramid is the celebrated Sphinx. Ruins of pyramids are to be found at Benares in India and in other parts of the East. Certain monuments of the ancient inhabitants, found in Mexico, are also called pyramids. These seem to have been intended to serve as temples, the tops of them being flat and surmounted by a house or chamber in which sacred rites were probably performed. The largest and perhaps the oldest of them is that of Cholula, which is said to have a base of 1,770 ft. and a height of 177 ft.

Pyr'amus and This'be, a pair of devoted lovers who, as their story is told by Ovid, resided in Babylon, and being prevented by their parents from meeting openly were in the habit of secretly conversing through an opening of the wall, as their houses adjoined. They agreed one day to meet at the tomb of Ninus, when Thisbe, who was the first at the rendezvous, was surprised by a lioness and took to flight. In her haste she dropped her garment, which the lioness seizing covered with blood, having immediately before killed an ox. Pyramus appearing on the scene, and concluding from the blood-besmeared robe that Thisbe was dead, killed himself. Thisbe returning soon afterward, and finding the body of her lover, also killed herself. The story was very popular in the time of Shakespeare, who made it the subject of the burlesque interlude in *A Midsummer Night's Dream.*

Pyrenees', a lofty mountain range, the crest of the main chain of which forms the boundary between France and Spain. It abuts with one extremity on the Mediterranean, and with the other on the Atlantic. Its length, from Cape Creux on the Gulf of Lyons, to Fontarabia on the Bay of Biscay, is about 280 mi., and its greatest breadth little more than 50 mi. It consists of two lines, which form parallel ridges about 20 mi. apart from each other, except near the center, toward which the range rises both from the east and west. The descent on the south side is much more abrupt than on the north. Its loftiest summits are near its center, where its culminating point, Maladetta, or Pic de Néthou, reaches a height of 11,424 ft. The principal passes in the Pyre-

nees, formed by the meeting of valleys from opposite sides of the axis, take in the east part of the chain the name of Cols, and toward the center that of Ports. Only four of these are conveniently practicable for carriages. In 1885 the French and Spanish governments agreed to the construction of two railways, of which the tunnels perforating the Pyrenees were to be made at the cost of both countries. In the Pyrenees is to be found some of the finest scenery in France. The climate, genial and warm, banishes perpetual snow to 1,300 ft. higher than the snow line of the Alps. The French Pyrenees abound in mineral springs, in connection with which are some of the gayest watering places in Europe, chief among them Bagnères de Luchon. Barège is in a dreary gorge, but its waters are celebrated for their efficacy.

Pyrhe'liometer, an instrument devised by M. Pouillet for measuring the intensity of the heat of the sun. It consists of a shallow cylindrical vessel of thin silver or copper, containing water or mercury in which a thermometer is plunged. The upper surface of the vessel is covered with lamp black, so as to make it absorb as much heat as possible, and the vessel is attached to a support in such a way that the upper surface can be always made to receive the rays of the sun perpendicularly. The actual amount of heat absorbed by the instrument is calculated by ordinary calorimetrical means. The area of the exposed blackened surface and the amount of water or mercury which has been raised through a certain number of thermometric degrees being both of them known, the absolute heating effect of the sun, acting upon a given area under the conditions of the experiment, can be readily found.

Pyrom'eter, any instrument, the object of which is to measure all gradations of temperature above those indicated by the mercurial thermometer. Wedgwood's pyrometer, the first which came into extensive use, was used by him for testing the heat of his pottery and porcelain kilns, and depended on the property of clay to contract on exposure to heat. Many different modes have been proposed or actually employed for measuring high temperatures; as by contraction, as in Wedgwood's; by the expansion of bars of different metals; by change of pressure in confined gases; by the amount of heat imparted to a cold mass; by the fusing point of solids; by color, as red and white heat, etc.

Pyr'otechny, the science of making and using artificial fireworks, the chief ingredients of which are niter, sulphur, and charcoal. Iron filings yield bright red and white sparks. Steel filings and cast iron borings contain carbon, and give a more brilliant fire with wavy radiations. Copper filings give flame a greenish tint, those of zinc a fine blue color; the sulphuret of antimony gives a less greenish blue than zinc, but with much smoke; amber, resin, and common salt give a yellow fire. Lampblack produces a very red color with gunpowder, and a pink with niter in excess. Verdigris imparts a pale green, sulphate of copper and sal-ammoniac a palm-tree green. Lycopodium, used also in the manufacture of stage lightning, burns with a rose color and a magnificent flame.

Pyrrho, a Grecian philosopher of Elis, founder of the Pyrrhonian or skeptical school, flourished about 340 B.C. He was early led to apply himself to philosophy by the writings of Democritus, and, accompanying his master, Anaxarchus, to India, in the train of Alexander the Great, he there became acquainted with the doctrines of the Brahmans, Magi, and other eastern philosophers. Spending a great part of his life in solitude, and abstaining from all decided opinions concerning moral and physical phenomena, he endeavored to attain a state of tranquillity not to be affected by fear, joy, or sorrow. He d. in his ninetieth year; the Athenians erected a statue in honor of him, and his countrymen, who had made him a high priest, raised a monument to his memory. His chief doctrines were the uncertainty of all human knowledge, and the belief that virtue is the only good. Pyrrho left no writings. It is only from the works of his later followers, particularly Sextus Empiricus, that we learn the principles of his school.

Pyrrhus (318–272 B.C.), king of Epirus, one of the most illustrious generals of antiquity. He was placed on the throne of his ancestors when about twelve years of age, and reigned peacefully five years, when advantage was taken of his absence to transfer the crown to his great uncle, Neoptolemus. After serving with his brother-in-law, Demetrius Poliorcetes, and greatly distinguishing himself at the battle of Ipsus, against Antigonus, B.C. 301, Pyrrhus recovered his dominions, which he shared with his rival, and then caused the latter to be put to death. He next contended for possession of Macedonia, and in 280 passed over into Italy to assist the Greeks against Rome. He defeated the Romans in two battles, but with severe loss to himself; then passed over into Sicily, returned to Italy again, and was defeated at Beneventum 275 B.C. He now retired to Epirus, took part in the Greek troubles, and was killed at Argos.

Pyrus, a genus of ornamental and fruit trees, the latter forming the chief of our orchard fruit, and belonging to the pomeous section of the nat. order Rosaceæ. There are about forty species, natives of the north temperate and cold regions.

Pythag'oras (586–506 B.C.), a Grecian philosopher. He is said to have gathered knowledge from the philosophers or learned men of Phœnicia, Syria, Egypt, Babylon, India, etc., but eventually settled at the Greek city of Crotona in Lower Italy, probably about 529 B.C. His abilities and character led great numbers to adopt his views. Three hundred of these were formed into a select fraternity or order, and were bound by vow to Pythagoras and each other, for the purpose of cultivating the rites and observances enjoined by their master, and studying his philosophy. The political influence of this body became very considerable,

and was exerted in the interest of the aristocratic party. The democratic party strenuously opposed the growing power of the order, and their enmity caused Pythagoras to retire to Metapontum. So far as we can judge, his system appears to owe very much to a vivid imagination acting upon the then prevailing ignorance respecting the order of nature. What was not known was guessed at, with the usual result. In the case of Pythagoras, as in that of other teachers of those early times, the popular effect of this partial knowledge was heightened by mingling it with secret doctrines. One of these doctrines was the transmigration of souls; and Pythagoras is said to have believed himself to have previously lived in several bodies. He had also abstruse theories respecting numbers, geometry, and music, which he valued very highly as fitting the soul for contemplation. The effect of his teaching, however, was such that his disciples are said to have paid him divine honors after his death. In appearance he was grave, commanding, and dignified. He abstained from all animal food, limiting himself to a vegetable diet. His public instruction consisted of practical discourses in which he recommended virtue and dissuaded from vice, with a particular reference to the various relations of mankind, as those of husbands and wives, parents and children, citizens and magistrates, etc.

Pythagore'an Theorem, the forty-seventh proposition of the first book of Euclid's Elements, which shows that in any right-angled triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Pyth'eas, a famous navigator of the Greek colony of Massilia, now Marseilles, supposed to have lived about the time of Alexander the Great (say 330 B.C.) He is reputed to have sailed along the west coast of Europe, entered the English Channel, and traveled some distance in Britain, then, continuing his journey northward, to have arrived at Thule (supposed to be Iceland). In a second voyage he entered the Baltic, where he proceeded as far as a river which he called Tanais, and on the banks of which amber was found. We only know of him through Strabo, Pliny, and others.

Pythian Games, one of the four great Grecian games, instituted in honor of Apollo, and celebrated at Delphi. Until about 586 B.C. they were under the management of the Delphians, and took place every eighth year; but after that date they were conducted by the Amphictyons, and celebrated every fourth year, prizes being given for flute-playing, athletic sports, and horse and chariot racing. Eventually, contests in tragedy, painting, sculpture, etc., were added. At first, prizes of silver or gold were awarded, but afterward the simple laurel wreath and palm branch were substituted. They continued to be celebrated until the end of the fourth century of our era.

Python, a genus and family of serpents allied to the family Boidæ or Boas. They are not venomous, but kill their prey by compression. The pythons belong exclusively to the Old World, and are of enormous size, sometimes attaining a length of 30 ft. They are found in India, and in the islands of the Eastern Archipelago, in Africa and in Australia. A rudimentary pelvis and traces of hinder limbs exist in the pythons, these structures terminating externally in a kind of hooked claw. The head exceeds the neck in thickness, and the mouth is extremely large. Aided by their prehensile tails, and rudimentary hinder limbs, the pythons suspend themselves from the branches of trees, and lie in wait near water for animals which come to drink. The genus *python* contains various species, the best known of which is the West African python, common in menageries. The female python hatches her eggs by the heat of her body.

Python.

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